Special Issue

INTERNATIONAL CONFERENCE ON

"EMERGING TRENDS IN TECHNOLOGY AND SCIENCE"

$(ICET^2S - 2017)$

02-04 March, 2017

Supported By

M.P. Council of Science & Technology, Bhopal



Organized by School of Research & Technology (Approved by AICTE, New Delhi)

People's University, Bhopal

ISO 9001:2008 certified University (Established under MP Act 17 of 2007) People's Campus, Bhanpur, Bhopal-462037 (M.P.), India Contact : 0755-4005487/82/67/59 Email: cetts.sort2017@peoplesuniversity.edu.in www.peoplesuniversity.edu.in

Chief Patron

Capt. Ambrish Sharma

(Director Administration) People's University, Bhopal

Patron

Dr. V. K. Pandya (Vice Chancellor) People's University, Bhopal

Convener

Dr. Keshavendra Choudhary Principal, SORT

Organizing Secretary

Mrs. Raji N. Mishra

Associate Professor & Head Department of Mechanical Engineering **Mr. Manoj Singh Tomar**

Associate Professor & Head

Department of Electronics & Communication Engineering

Advisory Committee

Prof. Xiao – Zhi Gao, Alto University, Finland Prof. Hai- Bin Duan Beihang University, China Elena Kropivka, Krivoyrog, Ukrain Dr. P.B. Sharma, VC, Amity Gurugram, India Dr.Abdul Khaliq, KFUPM, Saudi Arabia Dr. P.M.V. Subba Rao, IIT Delhi, India Dr. Sanjeev Jain, IIT Delhi, India Dr. P.S. M. Tripathi Ex. Deputy Director CFMRI, India Dr. K.K. Mishra Scientist (CFMRI), India Dr. Ritunesh Kumar, IIT Indore, India Dr. Veerendra Kumar, Director, DTE, Bhopal, India Dr. J.S. Chauhan, SATI, Vidisha, India Dr. Rajesh Kumar, DTU, Delhi, India Dr. K.K. Pathak, BHU, Varanasi, India Dr. Rajesh Purohit, MANIT, Bhopal, India Dr. Sanjeev Sahu(Scientist BARC, Mumbai), India Dr. R.K. Saxena, SGSITS, Indore, India Mr. Hari Rama Subramanian (IBM), India Dr. Ravi Shankar Mishra (LPU) Jalandhar, India

Editorial Board

Dr. Keshavendra Choudhary	Principal, SORT
Dr. Anshuman Sharma	Associate Professor, Department of Computer Science
Dr. Dilip Thakur	Professor, Department of App. Science & Humanities
Prof. Rakesh sakale	Associate Professor, Department of Civil Engineering
Prof. Vishwanath Tiwari	Associate Professor, Department of Electrical Engineering
Dr. Awadhesh Gupta	Associate Professor, Department of Electronic & Comm. Engg.
Dr. Amita Mourya	Professor, Department of Humanities
Prof. Manoj Singh Tomar	Associate Professor, Department of Electronic & Comm. Engg.
Prof. Raji Nareliya Mishra	Associate Professor, Department of Mechanical Engineering
Prof. Ankit Dwivedi	Assistant Professor, IBM-B.Tech

Managing Editor

Dr. Anshuman Sharma Prof.Raji Nareliya Mishra Prof.Manoj Singh Tomar

Eminents Keynote Speaker

Prof. (Dr.) J.S. Chouhan, Director, SATI, Vidisha, India Prof. (Dr.) R.K. Saxena, Director, SGSITS, Indore, India Prof. (Dr.) V. K. Jain, Former Professor, IIT, Kanpur, India Dr. Salil Prabhakar, CEO and President, California, USA Prof. (Dr.) S.K. Tiwari, Professor, JEC, Jabalpur, India Mr. Hari Rama Subramanian IBM, India

International Conference Core Committee

Dr. Anshuman Sharma (HOD) Dr. Dilip Thakur (HOD) Mr. Rakesh Sakale (HOD) Mr.Vishwanath Tiwari (HOD) Ankit Kumar Dwivedi Ms. Meenu Vaidya Computer Science & IT App. Science & Humanities Civil Engineering Electrical Engineering B.Tech (IBM) Administrative Officer

Mr.Manish Gangil	Mechanical Engg.	Ms. Swati jain	App. Sci And Hum.
Mr.Rajesh ku.Soni	Mechanical Engg.	Ms. Sunita Parnam	App. Sci And Hum.
Mr.Shashikant Sharma	Mechanical Engg.	Mr. R C Patil	Civil Engineering
Mr. Bhupendra Koshti	Mechanical Engg.	Mr. Govind Singh Solanki	Civil Engineering
Mr Vimal Mishra	Mechanical Engg.	Mr. Oman Sayyad	Civil Engineering
Ms. Richa Thakur	Mechanical Engg.	Mr. Kapil Sharma	Civil Engineering
Mr. Inder Singh Nagar	Mechanical Engg.	Ms.Harshita Lahre	Civil Engineering
Mr. Avinash Patidar	Mechanical Engg.	Mr.Satish kumar Kushwah	Civil Engineering
Mr.Arvind Kumar Chauhan	Mechanical Engg.	Mr.Hirendra Pratap Singh	Civil Engineering
Mr. Yogesh Parkhi	Mechanical Engg.	Ms. Jiji M. Thomas	Civil Engineering
Mr.Pushkar Dwivedi	Mechanical Engg.	Mr. Deepak K. Bandewar	Civil Engineering
Mr.Indal Singh	Mechanical Engg.	Ms. Deepali Tiwari	Civil Engineering
Dr. Girjesh Singh	App. Sci And Hum.	Ms.Komal Tahiliani	CS/IT
Dr. Saumya Shukla	App. Sci And Hum.	Ms.Shital Gupta	CS/IT
Mr. Dilip Ku. Gupta	App. Sci And Hum.	Ms.Sudhir Goswami	CS/IT
Mr. Dinesh Tiwari	App. Sci And Hum.	Ms.Pankaj Savita	CS/IT
Ms. Ritu Sahu	App. Sci And Hum.	Mr.Murlimanohar Vishwakarma	CS/IT

Ms.Priyanka Thakur	CS/IT	Aditya Pare	IBM
Mr.Bhupendra Malviya	CS/IT	Prakhar Tiwari	IBM
Mr.Ankit Temurnikar	CS/IT	Priyank Dubey	IBM
Mr.Rahul Tiwari	CS/IT	Anjul rai	IBM
Ms.Sana Siddiqui	CS/IT	Ayushi Chawala	IBM
Ms.Deepti Agrawal	EC	Anoop George	IBM
Ms. Divya Rai	EC	Alisha Hashmi	IBM
Mr. Yash K Kshirsagar	EC	Rajesh Kourav	Technical CS/IT
Mr. Hitesh Chandak	EC	Ramswaroop Shankwar	Technical CS/IT
Mr. Akhilesh Patel	EC	Md Rizwan	Technical CS/IT
Ms. Priya Sharma	EC	Hari Suman	Technical CS/IT
Ms Kavita Thakur	FC	Sumaiya Mateen	Technical CS/IT
Mr.S.S. Rajput	EC	Ramesh Kumar Vishwakarma	Technical Appl.Sc.
Mr.Vimlesh Kumar Sahu	EC	Mukesh Jain	Technical Appl.Sc.
Mr.Manish Sahu	EC	Kuljeet Singh Saini Janak Lal Gadekar	Technical EE Technical EE
Mr.Rahul Pandey	EC	Pushpendra Panjariya	Technical Civil
Mr.Lokesh Shukla	Electrical Engg.	Satish Vishwakarma Md Poobullah Khan	Technical EC
Mr.Manish Kethoriya	Electrical Engg.	Rizwan	Administration
Ms.Priyanka Kushwaha	Electrical Engg.	Sachin Sahu	Administration
Ms.Sweta Lall	Electrical Engg.	Rahul Bhadoriya	Administration
M N I D I'		Deepa Agrawal	Administration
Ms.Neha Palia	Electrical Engg.	Priyanka Singh	Administration
Mr. Sarthak Vishwakarma	Electrical Engg	Rekha Masksole	Administration
G. Sowjanya	IBM	Rajesh Neekhra Devesh Barodia	Administration Administration

PREFACE

The rapidly changing global environment with technologies & techniques in all the arenas of Engineering and science has emerged as the bedrock for survival & development. The way technologies have revolutionalised the Globle economy, presence of new challenges and opportunities for the world demands the platform like this conference.

We present with immence satisfaction and pleasure the special issue of proceedings of the research papers received for the International Conference on "Emerging Trends In Technology and Science" (ICET²S-2017) scheduled on March 02-04, 2017 at School of Research & Technology, Bhopal.

The University provides stimulating venue for discussing the latest development in Technology & Science. The technical program will consist of peer- reviewed presentations in parallel to Technical sessions, Key note lectures, Presentations by Industry Professionals, Poster Presentations and Model Making competitions. Such interactions will facilitate better understanding about technological developments across the globe amongst the peers.

This conference provides an excellent opportunity for delegates to exchange ideas on latest Emerging Trends in the engineering, whether an Industrial Practitioner, Academic Researcher and Engineering students in this field.

The conference attracted more than 150 delegates and prominent speakers from renowned technical Institutions and industries of India at School of Research and Technology, Bhopal to pill their brain waves together and shared their view point on theis common platform in ten different technical sessions along with an exclusive keynote session. All papers of highly specialized expert groups have been presented at the conference covering virtually all major facets of Engineering.

We wish to express our sincere appreciation to all the members of the Advisory Committee, Orgainizing Committee, all the staff members of School of Research and technology for their invaluable supports and contributions in organizing and conducting this conference. We are also very greatful to the authors, including the invited keynote speakers, who made the conference what it was. Finally, we sincerely appreciate the invaluable inputs and meaningful discussions enjoyed by all the participants. Last but not the least; we are also greatful for the support from Mr. Mohan Samuel, Mr. Malay Dutta, Mr. O.P. Kushwaha (Central Bank of India), Dr. C. Patil, (Director, MPCST) and Dr. Amita Tilwari (Sr. Scientist, MPCST).

We hope this special issue of Journal will be of interest to researchers as well as to students in evolving the further advancements in the field of Technology and Science.

CONTENT

S.NO	LIST OF ARTICLES	PAGE NO
1	AN IMPROVED HYBRID DSTATCOM TOPOLOGY TO COMPENSATE REACTIVE	1
	AND NONLINEAR LOADS01	
	NAMRATA MISHRA, SONAM MISHRA	
2	FAULT ANALYSIS AND CONTROL FOR A GRID CONNECTED PHOTOVOLATIC	8
	SYSTEM	
	MANISH KETHORIYA, LOKESH SHUKLA	10
3	SUDHIR GIRI, SWETA LALL, PRIYANKA KUSHWAHA	12
4	STATCOM STATCOM BASED VOLTAGE CONTROLLER FOR SELF EXCITED	19
	INDUCTION GENERATOR FEEDING NON LINEAR LOADS	
	VISHWANATH TIWARI, PARUL SHRIVASTAV	
5	ELECTRICAL LIBERATION MACHINING - ASTATE-RUN	28
	MANISH GANGIL,ARVIND KUMAR CHAUHAN,M.K PRADHAN	
6	EXPERIMENTAL COMPARATIVE STUDY OF MECHANICAL POWER AND	35
	MECHANICAL EFFICIENCY OF HORIZONTAL AXIS TWO AND THREE BLADE	
	MICRO WIND TURBINE	
	RAJENDRA PRASAD JARELE, AMIT AGRAWAL, S.K. AGRAWAL	
	EXPERIMENTAL INVESTIGATION OF USING ETHENOL AND GASOLINE BLENDS	40
	IN SINGLE CYLINDER 4 STROKE STENGINE	
0	ANAND MUDI, C.S. KULI, S.K. AGRAWAL	50
8		50
	VUESH VERMA SAVITA DIVIT GA IENDRA DIVIT	
9	RECENT DEVELOPMENTS IN SIMULATION TECHNIQUES FOR VAPOUR COMPRESSION	54
5	REERIGERATION SYSTEMS	54
	ARVIND KUMAR CHAUHAN, MANISH GANGIL, M.K PRADHAN	
10	STEADY STATE THERMAL ANALYSIS OF IPMSM WITH WATER COOLING	61
10	JACKET FOR RAILWAY VEHICLES USING ANSYS	01
	OMSHANKAR JHARIYA, RAJI N.MISHRA	
11	SCIENCE & TECHNOLOGY FOR SPECIALLY ABLED PERSONS	66
	SHASHANK MEHROLIA, EISHA GANJU, ALKA SINGH	
12	A NEW METHOD OF NEURAL NETWORK BASED FAST FRACTAL IMAGE	69
	COMPRESSION	
	MR. ASHOK AGARWAL , MR.AMIT SAWASKADE, MR. HITESH CHANDAK	
13	AN IMPROVED BRAIN TUMOR DETECTION BY USING MODIFED FUZZY C-	74
	MEANS METHOD	
	SYED FAIZAN UL AZIZ, NEELESH GUPTA, NEETU SHARMA	
14	ANALYSIS OF IMAGE COMPRESSION ALGORITHM USING BLOCK TRUNCATION	90
15		105
15	SEGMENITATION FOR GRAV SCALE IMAGE	105
	RAHIII SHARMA AJEET SHRIVASTAVA DR PRASHANT MOR	
16	A MEDICAL DIAGNOSIS USING ARTIFICIAL IMMUNE RECOGNITION SYSTEM	116
10	PRIYANKA THAKUR , BHUPENDRA MALVIYA RAHULGUPTA	110
17	A REVIEW OF SECURITY ISSUES IN CLOUD COMPUTING	125
	SHITAL GUPTA, SANA SIDDIQUI. KOMAL TAHILIANI	•
18	A REVIEW OF VARIOUS EFFICIENT TECHNIQUES AND ITS RELATED	131
	MEASURES FOR SECURITY RELATED PROBLEMS	
	MS.VARSHA JOTWANI, DR.AMIT DUTTA , MS.MADHU SINGH	

19	SYSTEMS: MOBILE HEALTH CARE CHALLENGES AND OPPORTUNITIES HONEY SHARMA, NISHI BAMNIA	134
20	PREVENTION OF DATA CONTENT LEAKAGE WITH SECURED ENCRYPTION ALGORTHIM MR SAGAR PRASAD MS MAI TI NAGLE MR TARIQUE ZEYA KHAN	138
21	TO COMPARE THE FRESH AND HARDENED STATE PROPERTIES OF SELF COMPACTING CONCRETE PRODUCE BY USING FRESH & RECYCLED AGGREGATES" AVANISH KUMAR, R.C. PATIL, JIJI M THOMAS	150
22	APPLICATION OF NANOTECHNOLOGY IN SMART CIVIL STRUCTURES	153
23	REVIEW PAPER OF VARIABLES THAT EFFECT SERVICE LIFE OF CONCRETE STRUCTURE WASEEM KHAN, ASLAM HUSSAIN, HIRENDRA PRATAP SINGH	159
24	THE EFFECT OF USING WASTE GLASS AND WASTE PLASTIC MATERIAL ON THE ASPHALT PAVEMENT PROPERTIES" VIVEK SINGH,RAKESH SAKALE,R.C. PATIL	164
25	PERFORMANCE OF SHORT LENGTH BATTER PILE IN EXPANSIVE SOIL UNDER THE FLOOR <i>K G KIRAR</i>	169
26	FINITE ELEMENT AND ASPECTS OF EXERGY EVALUATION OF CONVENTIONAL FORGING DEFORMATION BEHAVIOUR OF MATERIAL PROCESSING SANTOSH SANODIYA . DR. KESHVENDRA CHOUDHARY. DR. MANVIJAY SINGH	187
27	ANALYSING THE PERFORMANCE OF MAP REDUCE ENGINE USING DATA PREFETCHING MECHANISM SHWETA GUPTA ABHILASHA SINGH, SUDHIR GOSWAMI	203
28	EFFECT OF SISAL FIBRE CONTENT ON THE MORPHOLOGY OF NON RECYCLABLE WASTE COMPOSITE. SAVITA DIXIT,' KIRAN ROHIT	210
29	SIMULATION OF SECOND ORDER SIGMA DELTA ADC FOR IMPROVING SNR USING OSR WITH NOISE SHAPING NEHA SINGH RATHAUR, RAJESH BABU AHIRWAR, INDRA KUMAR SHA	214
30	EFFICIENT HARDWARE DESIGN FOR AN MODULO ADDER BASED ON RESIDUE NUMBER SYSTEM BEERENDRA PATEL. ANKIT KUMAR DWIVEDI. AKHILESH PATEL	218
31	A FUZZY LOGIC BASED DISTRIBUTED VOLTAGE REGULATOR FOR THE HARMONICS AND POWER SAG IMPROVEMENT IN THE POWER DISTRIBUTION SYSTEM. VISHWANATH TIWARI, ROHIT GUPTA	224
32	MEASUREMENT TECHNIQUES OF LEAKAGE AND GROUND CURRENTS SARTHAK VISHWAKARMA, NEHA PALIYA	224
33	MINIMIZATION OF LOAD SHEDDING USING EVOLUTIONARY PROGRAMMING TECHNIQUES SWETA LALL , PRIYANKAKUSHWAHA	225
34	REVIEW PAPER ON BLOCK TRUNCATION CODING FOR GRAY SCALE IMAGE USING VECTOR QUANTIZATION LEKHRAJ KUSHWAHA,MANISH SAHU	226
35	SMART GRID SECURITY ANALYSIS BY USING ARTIFICIAL NEURAL NETWORK LOKESH SHUKLA, NEELAM SAMKARIA, ANU SAMKARIA	226
36	STUDY OF FACTS DEVICES FOR CONTROLLING REACTIVE POWER IN POWER SYSTEM BASHEEM SAUDAGAR, PRIYANKA KUSHWAHA, SWETA LALL	227
37	STUDY AND METHOD TO REDUCE KNOCKING IN SI ENGINE FAISAL JAWED KHAN, BUPENDRA KOSHTI, PUSKAR DEWEDI	227

38	A STUDY FOR POTENTIAL ESTIMATION USING RENEWABLE ENERGY	228
50	TECHNOLOGIES FOR DOMESTIC COOKING IN INDIA FOR PURAL	220
20	SUSHIL KUMAR KUSHWAHA, MR.SHASHIKANT SHARMA, RAJI N.MISHRA	000
39	ANALYSIS OF BALLIZING PARAMETERS SUPER FINISHING BALLIZING	228
	PROCESS FOR EVALUATION OF DIFFERENT FORCES	
	PAWAN K. UPADHYAY	
40	ANALYSIS OF SEMI-CIRCULARTRANSVERSE RIB'S ROUGHENED SOLAR AIR	230
	HEATER WITH DIFERENT DIAMETER USING CFD"	
	RISHI KUMAR AHIRWAR, YOGESH PARKHI	
41	APPLICATIONS OF NANOTECHNOLOGY IN FUTURE AUTOMOBILES	230
	INDER SINGH NAGAR. BHUPENDRA KOSHTI . ASHWIN BHAISARE	
42	BIO-DIESEL PRODUCTION FROM WASTE COOKING OIL WITH FACTOR	231
	AFFECTS TO ITS FORMATION	201
	ABDUL KARIM CHALIDHARY DR KESHAVENDRA CHOLIDHARY SHASHIKANT	
	SUADMA	
40		000
43	DESIGN AND IMPLEMENTATION OF OFFGRID SOLAR PV AT THE ROOF TOP	232
	AADITYA SINGH TOMAR, VAIBHAV SINGHAI	
44	NUMERICAL SIMULATION OF SCRAM-JET COMBUSTOR USING DOUBLE WALL	232
	INJECTOR	
	DHARMENDRA KUMAR DR. KESHAVENDRA CHOUDHARY	
45	PERFORMANCE EVALUATION OF POWER SAVING MECHANISM IN IEEE	233
	802.16E MOBILE WIMAX	
	MANISH SAHU, RAHUL PANDEY, MS. DEEPTI AGRAWAL	
46	ADAPTIVE CHANNEL ESTIMATION TECHNIQUE IN MIMO-OFDM SYSTEM FOR	233
	VYOMKESH SINGH MOURYA KAVITA THAKUR	
47	DEMONSTRATION OF Y-IUNCTIONS WAVEGUIDE USING PHOTONIC CRYSTAL	234
/	AKHILESH PATEL BEERENDRA PATEL ANKIT KLIMAR DWIVEDI	204
10		224
40		234
40		225
49		235
	SHAIL SINGH THAKUR, KAVITA THAKUR	
50	SMART ANTENNA FOR HIGH SPEED WIRELESS COMMUNICATION	235
	DEEPTI AGRAWAL, MANISH SAHU, RAHUL PANDEY	
51	DESIGN OF A RECONFIGURABLE ARBITER USING AMBA AHB PROTOCOL	236
	VIMLESH KUMAR SAHU	
52	HIGH SPEED AREA EFFICIENT LINEAR CONVOLUTION USING UNSIGNED AND	236
	SIGNED MULTIPLIER	
	AIMEN CHOUDHARY, DEEPTI AGRAWAL, SURENDRA SINGH RAJPOOT	
53	SURVEY PAPER ON FINGERPRINT IMAGE ENHANCEMENT AND MINUTIAE	237
	EXTRACTION TECHNIQUES	
	RIPU RAJ. DIVYA RAL	
54	REID TECHNOLOGY FOR SUPPLY CHAIN APPLICATION	237
54	MANO I SINGH TOMAR DIVVA RALAKHILESH PATEL	201
55		220
55		230
	RAHUL RAIKWAR, YASH KSHIRSAGAR, AKHILESH PATEL	
56	AN IMPROVED SPECTRUM SENSING TECHNIQUE USING MATCHED FILTER	238
	DETECTION WITH A NP OBSERVER	
	RAHUL PANDEY, DEEPTI AGRAWAL, MANISH SAHU	
57	REVIEW OF HIGH DENSITY SALT AND PEPPER NOISE REMOVAL BY MEDIAN	239
	FILTER	
	RAHUL KUMAR, VIMLESH KUMAR SAHU	

58	REVIEW PAPER ON IEEE 754 FLOATING POINT MULTIPLIER USING MODIFIED	239
	CSA	
	BHUPENDRA SINGH SOLANKI, MANOJ SINGH TOMAR	
59	DESIGN OF ENCODER AND DECODER FOR GOLAY CODE	240
	SHUBHAM SHRIVASTAVA, RAHUL PANDEY	
60	A NOVEL TECHNIQUE OF DATA CACHING USING ARTIFICIAL NEURAL	240
	NETWORK IN MOBILE ENVIRONMENT	-
	PANKAJ SAVITA, SIDDHARTH PANDEY, MADHULIKA GOSWAMI	
61	AN EFFICIENT TECHNIQUE FOR INTRUSION DETECTION SYSTEM TO	241
	IMPROVE THE DETECTION RATE USING ANN TECHNIQUE	
	AAKANKSHA KORI. HARSH MATHUR	
62	PERFORMANCE SIMULATION OF A PARABOLIC TROUGH SOLAR COLLECTOR	241
	SOLAR ENERGY	
	MD TAHIR HUSSAIN SHASHIKANT SHARMA	
63	IMPLEMENTATION OF SOLAR ENERGY IN EXISTING THERMAL POWER PLANT	242
00	YOGESH PARKHI, RICHA THAKIJT, HEMANT, JAIN	272
64	EXPERIMENTAL STUDY ON LIGHT WEIGHT BLOCK OF PAPERCRETE	2/3
04	ANKLIR KR GLIPTA HIRENDRA PRATAP SINGH HARSHITA I AHARE	245
65	AN INVESTIGATION INTO THE ROLE OF SITE AND SOIL CHARACTERISTICS IN	244
05	ON_SITE SEWAGE TREATMENT	244
	ABHISHEK SINCH BACHEL ABHISHEK DUBEV ALOK DUBEV	
66		245
00	KISK MANAGEMENT IN CONSTRUCTION PROJECTS	240
67	AJAT CHAURASIA , PROF. GOVIND SINGH SOLANNI, PROF. HARSITA LAHARE	045
67	USE OF GRAINES IN CONSTRUCTION TEGHNOLOGY	240
	AJAY KUMAR SHUKLA, KAKESH SAKALE, KAPIL SHARMA	0.40
68	RESULT ANALYSIS OF PRODUCTION OF CONCRETE BASED ON	246
	AGGREGATES BY APPLYING STATISTICAL QUALITY CONTROL TOOLS.	
	RAHUL SINGH, RAKESH SAKALE, R.C. PATIL	0.47
69	FLOATING COLUMNS: A CRITICAL APPROACH INTENDED FOR DIFFERENT	247
	DEEPAK KUMAR BANDEWAR, GOURAV SACHDEVA, ANKIT SACHDEVA	0.47
70		247
	RANE PRASHANT TIKARAM, DINESH WANKHEDE, VIVEK SINGH	
71	A STUDY ON IMPACT OF CONCRETE CONSTRUCTION ON ENVIRONMENT	248
	DHEERAJ KUMAR PANDAY,GOVIND SINGH SOLANKI,DIPALI TIWARI	
72	ENVIRONMENTAL PERFORMANCE OF CONSTRUCTION OPERATIONS AND ITS	248
	MANAGEMENT FRAMEWORK	
	S.SAHARE, JIJI M, THOMAS, G.S. SOLANKI	
73	INCREASE IN STRENGTH OF CONCRETE BY USING BOTTLE CAPS	249
	ROOPESH VISHWAKARMA, SATISH KUMAR KUSHWAH, KAPIL SHARMA	
74	COMPARATIVE STUDY OF BRICKS MADE WITH ALTERNATIVE MATERIALS TO	250
	CLAY BRICK	
	RASHTRA BANDHU, AMAN KHARE,GOVIND SINGH SOLANKI	
75	RELATIONSHIP BETWEEN NON-DESTRUCTIVE TESTING OF REBOUND	251
	HAMMER AND DESTRUCTIVE TESTING	
	SAMUNDER SINGH RAJPUT , PROF. SATISH KUMAR KUSHWAH, PROF.	
	RAKESH SAKALE	
76	PERFORAMANCE ANALYSIS OF EXPANSIVE SOIL TREATED WITH STONE	252
	DUST AND FLY ASH	
	YASPAL RAJPUT, PROF. HIRENDRA PRATAP SINGH, AKSHAY TRIVEDI	
77	CHEMICAL ADMIXTURES USED IN CONCRETE MIX DESIGN TO IMPROVE THE	253
	QUALITY OF CONCRETE AND FOR THE MAINTENANCE OF CONCRETE	
	SHANU AGRAWAL, RAVIKANT SINGH, SHIVENDRA NATH MISHRA	
78	SOLID WASTE USED AS CONSTRUCTION MATERIAL	253
	CHAUDHARI BHUSHAN ARUN GOVIND SINGH SOLANKI	

79	EFFECT OF SLOPING GROUND ON STRUCTURAL PERFORMANCE OF RCC	254
	BUILDING UNDER SEISMIC LOAD	
	SITARAM VISHWAKARMA,DIPALI TIWARI,JIJI M THOMAS	
80	SEISMIC BEHAVIOR OF BUILDINGS HAVING HORIZONTAL IRREGULARITIES	255
	SUJEET LOWANSHI , PROF. HIRENDRA PRATAP SINGH PROF. DEEPAK	
	BANDEWAR	
81	TECHNO ECONOMICAL GEOPOLYMER CONCRETE USING FLY ASH TO	255
	SUSHEEL TIWARI,R.C. PATIL NARENDRA PATEL	050
82	DEVELOPMENT OF BRICKS FROM WASTE MATERIAL: A REVIEW PAPER	256
	CHAUUDHARI TEJAS PRAKASH,GUVIND SINGH SULANKI, PATIL BHUSHAN	
02		257
03	VIVER PATEL KAPIL SHARMA DILIP SAHLI	257
8/	A EEEICIENT APPROACH OF STENOGRAPHY IN MULTIMEDIA EILES	258
04	DR ANSHUMAN SHARMA ARPIT SHARMA AMIT DWIFVDI	200
85	EFEICIENCY PREDICTION OF SOLAR AIR HEATER WITH THE USING OF	259
00	DIFFERENCE SIZE OF RIBS BY COMPUTATIONAL FLUID DYNAMICS	200
	SAURABH MAHARANA. AVINASH PATIDAR. VIMAL MISHRA	
86	SALIENT FEATURES OF NON-CONVENTIONAL ENERGY RESOURCES	260
	V.KHADE, S.CHOUDHARY	
87	DEPENDENCY OF COSMIC RAY MODULATIONS ON HELIOSPHERIC	260
	PROCESSES	
	A.GHOSH, S .CHOUDHARY	
88	GREEN TECHNOLOGY FOR THE ENVIRONMENT	261
	HEMLATA RAIKWAR (RESEARCH SCHOLAR)	
89	LUMINESCENCE STUDIES OF ZINC SELENOID NANOPARTICLES EMBEDDED	262
	IN PVA MATRIX	
	KAMAL K. KUSHWAH 1, S.K. TIWARY 1, AND M.RAMRAKHIANI	
90	LUMINESCENCE STUDIES ON POLYMER NANOCOMPOSITES LAYERS	263
	(UDSE/PVA & ZNSE/PVA)	
01		264
91	KAUSHIKI SHARMA	204
92	REVIEW ON NANGELECTRONIC DEVICESPRAMOD KUMAR(PHD SCHOLAR)	264
52	PANKAJ DUBEY IZHAR MOHD KHAN	204
93	EFFECT OF A POLYHERBAL FORMULATION OF TWO HERBS VIZ. TRIDEX	265
	PROCUMBENS (L.)	
	AND BRYOPHYLLUM PINNATUM (L.) TO PROMOTE HYPOGLYCEMIA	
	S. DIXIT, S.NAIR, N.GANESH	
94	IMPACT OF JAPANESE COLLABORATION& MANAGEMENT PRACTICES ON	266
	INDIAN MANUFACTURING SYSTEM	
	SHAILENDRA SHARMA	
95	"GREEN BUILDING" LEADER IN ENERGY & ENVIRONMENT DESIGN FOR	267
	BUILDING SECTOR, SHUBHAM JAIN, KAPIL SHARMA	
96	REVIEW PAPER ON REVERSIBLE BCD ADDER SUBTRACTOR USING	268
07		260
97	ANKIT TEMI IRNIKAR KAI VANI SAHI I	209
08	ENERGY MANAGEMENT SYSTEM IN HEV LISING PLOONTROLLER	260
30	KRTIKA PRAKASH VISHWANATH TIWARI	203
99	A COMMON FIXED POINT THEORM FOR SUB COMPATIBILITY MAPPINGS	270
	SATISFYING CONTRACTION OF INTEGRAL TYPE IN MENGER SPACES	
	NAVAL SINGH, DILIP KUMAR GUPTA, DINESH TIWARI	

100	ESTIMATION OF WIND LOAD ON A DOUBLE ARCH TYPE GREENHOUSE AND EVALUATION OF THE STRUCTURAL STABILITY USING FINITE ELEMENT METHOD AJIT KUMAR NAYAK	271
101	THE COMPARISON OF RATE OF HEAT TRANSFER FOR HELICAL COIL HEAT	273
	AJEET KUMAR, AVINASH PATIDAR PAWAN KUMAR PATIL	
102	BIO DIESEL FROM MIXTURES TREE BASED OIL, PERFORMANCE IN A DIESEL	274
	ENGINE AND ENVIRONMENTAL ISSUES	
	P.C.JENA, H. REHEMAN	
103	ENGINEERING AND HUMANITIES,	275
	DR. SOUMYA SHUKLA	

Om Prakash Kohli



RAJ BHAVAN BHOPAL-462 052

B

MESSEGE

I am happy to learn that People's University, Bhopal is organizing an International Conference on "Emerging Trends in Technology and Science" (ICET'S-2017) on 2-4 March, 2017 and a souvenir is also being published on this occasion.

This multidisciplinary Conference should aim to bring Professional Engineers, Academicians and Research Scholars associated with different branches of Engineering on a common platfrom to share new ideas, expereiences and knowledge in Engineering and allied Science.

I extend my heartiest wishes to the organizers and warm welcome to all the delegates to the Conference. I believe that the souvenir shall serve as a memorable document.

My best wishes.

O.P. Hole:

(Om Prakash Kohli)

Shivraj Singh Chouhan Chief Minister



Government of Madhya Pradesh BHOPAL - 462 004 Sl. No. 79, 22 Feb., 2017

Message

I am delighted to learn that the People's University, Bhopal is organising an international conference on "Emerging Trends in Technology and Science-ICET's 2017"

India is known for its scientific acumen and innovations in technology. India is the only country in the world where science and spiritualism exist together and are complementary to each other. All Indian cultural traditions rest firmly on fundamental scientific theories. The masses possess high degree of indigenous scientific knowledge and wisdom.

I wish the conference a grand success.

Regards.

21 DIM. (Shivraj Singh Chouhan)

निवास : डी - 1, चार इमली, भोपाल (म.प्र.)	
दूरभाष	2441171 2430876
чя ж 457	
भोपाल, दिनांक .17.).२.).1.न	H



जयभान सिंह पवैया मंत्री उच्च शिक्षा, लोक सेवा प्रबंधन, जन शिकायत निवारण मध्यप्रदेश शासन



संदेश

बडे हर्ष का विषय है कि पीपुल्स यूनिवर्सिटी भोपाल द्वारा विज्ञान एवं तकनीकी शिक्षा के क्षेत्र में अंतराष्ट्रीय काफ्रेंस 'Emerging Trends in Technology and Science' का आयोजन किया जा रहा है।

पीपुल्स ग्रुप द्वारा चिकित्सा एवं शिक्षा के क्षेत्र में जो योगदान दिया जा रहा है, वह प्रशंसनीय है। समाज के विभिन्न वर्गो के लोगों को स्वास्थ्य व शिक्षा के माध्यम से समाज की मुख्य धारा में लाकर देशहित में

जो कार्य किया जा रहा है, उसके लिये पीपुल्स ग्रुप बधाई का पात्र है। इस अंतराष्ट्रीय काफ्रेंस के आयोजन से सभी शिक्षको एवं शोधार्थियों को विज्ञान व तकनीक के क्षेत्र में नित नये हो रहे बदलावो के बारे में जानने का अवसर मिलेगा, जिससे उन्हें भविष्य में शोध कार्य करने के लिए एक नई दिशा प्राप्त होगी।

पीपुल्स विश्वविद्यालय के प्रशासन, शिक्षकों व छात्रो के उज्जवल भविष्य के लिये मेरी ओर से हार्दिक शुभकामनाएँ।

(जयभान सिंह पवैया)

प्रति,

पीपुल्स यूनिवर्सिटी, भोपाल

ई-8/83, शिवा कुंज रेलवे कॉलोनी, 12 नं. स्टॉप के पास भोपाल-462 016 (म.प्र.)



आलोक संजर संसद सदस्य (लोक सभा) 19, भोपाल

नई दिल्ली-110 001

175, नॉर्थ एवेन्यू

पत्र क्रमांक 31.4

दिनांक-२\...... TR.P.L.

--: शुभकामना संदेश :--

मुझे यह जानकर प्रसन्नता है कि स्कूल ऑफ रिसर्च एण्ड टेक्नोलॉजी, पीपुल्स विश्वविद्यालय, भोपाल द्वारा दिनांक 02 मार्च से 03 मार्च, 2017 तक 03 दिवसीय अंतर्राष्ट्रीय सेमिनार का आयोजन किया जा रहा है। सेमिनार के माध्यम से शोधार्थियों एवं नवयुवकों को नई-नई तकनीकि एवं इंजीनियरिंग ज्ञान से जागरूक कराना एक सराहनीय कार्य है। प्रस्तावित कार्यक्रम इसी श्रृंखला में एक सराहनीय प्रयास है।

सेमिनार के सफल आयोजन हेतु मेरी ओर से हार्दिक शुभकामनाएं।

"शुभकामनाओं सहित"।

Anmingis (आलोक संजर)

प्रति,

संचालक. स्कूल ऑफ रिसर्च एण्ड टेक्नोलॉजी पिपुल्स विश्वविद्यालय, भोपाल (म.प्र.)।

रेलो-फीक्स नं.: 0755-2725097 (Resi.), मोबाइस नं.: 09425005952 (M.P.), 09013869238 (Delhi) E-mail:aloksanjar.mp@gmail.com

विश्वास सारंग

राज्यमंत्री सहकारिता (स्वतंत्र प्रभार), भोपाल गैस त्रासदी राहत तथा पुनर्वास (स्वतंत्र प्रभार), पंचायत एवं ग्रामीण विकास विभाग.





शुभकामना संदेश

सार्वजनिक जनकल्याण परमार्थिक न्यास, भोपाल के द्वारा पीपुल्स युनवर्सिटी के अंतर्गत संचालित विभिन्न शिक्षण संस्थाओं के द्वारा जन सामान्य के लिए स्वास्थ्य सेवाओं में एवं तकनीकी सेवा क्षेत्र में उच्च कोटि का शिक्षण कार्य कराकर समाज के लिए बहुउपयोगी डाक्टरस्/इन्जीनियर्स आदि को तैयार किया जा रहा है।

यह प्रशंसनीय है कि इन्जीनियर्स को नियमित शिक्षण कार्य के अतिरिक्त अन्तराष्ट्रीय स्तर के विद्वानों के साथ ''इमरजिंग ट्रेन्डस् इन टेक्नोलॉजी एण्ड साइंस'' विषय पर मार्च-2017 में कान्फ्रेंस आयोजित की जा रही है। इससे निश्चित ही विद्यार्थियों एवं अन्य संबंधित व्यक्तियों के तकनीकी ज्ञान में इन्जीनियरिंग में नई प्रगति एवं विद्याओं से परिचित होने का अवसर प्राप्त होगा।

इस शुभ अवसर पर मेरी ओर से हार्दिक शुभकामनाएं।

शुभकामनाओं सहित।

(विश्वास सारंग).

Prof. Akhilesh kumar Pandey M.Sc. Ph.D., D.Sc., FBA, FMA, FNRS (Prof of Bio Science, R.D.V.V. Jabalpur) Chairman



M.P. Private Universities Regulatory Commission Govt. of M.P. Gyan Vatika, Valmi Road, Opp. Excrilence College Kalisot Dame, Bhopal- 462016 Mob.: +91-98261 68512 Off.: 0755-2490577, Fax: 0755-2490322 E-mail:akpmycol@yahoo.co.in, rdvvbiotechnology@gmail.com



Message

It gives me pleasure to learn that Peoples University, Bhopal is organizing International Conference on "Emerging Trends in Technology and Science" on 02nd March, 2017.

There is no doubt about the progress made by India in the field of Technology and Science. The country remained 'Jagatguru' and the 'Golden Birds' for years. Since ancient times India has had an illustrious tradition of scientific enquiry. Numerous fundamental scientific and mathematical concepts are attributed to ancient Indian scientists. Such concepts and discoveries have laid down the basis for development of many technologies including in the field of Technology and Science. However, India has become one of the well recognized leader in many fields but there is a gradually declined in the enrollment of students in research during the recent years. It may be unawareness about the scientific discoveries.

Looking to the significance of indigenous innovations in nation building, selection of such themes for discussion are really important. The assembly of a large number of academicians, researchers and professionals engaged in various aspects will provide a stimulus for intellectual growth and a new direction for work to all concerned.

I wish good luck and congratulate to all participants and thank the team of organizers for taking such initiatives to organising International Conference and wish them all the success.

Pandey W1217

Res.: Flate No. 1, Block-4 M.P. Bhoj (Open) University Raja Bhoj Marg, Chinabhati, Kolar Road, Bhopal-462016 Phone: 0755-2490325

Prof. (Dr.) Veerendra Kumar Director



Directorate of Technical Education, Madhya Pradesh 4th Floor, Satpura Bhawan, Bhopal-462004 (M.P.) Phone : (O) : 0755-2576751 E-mail : prof.veerendra.kumar@gmail.com

MESSAGE



I am immensely pleased to know that International Conference on "Emerging Trends in Technology And Science" (ICET²S-2017) is being organized by People's University, Bhopal during 2nd – 4th March, 2017.

I hope it would be an opportunity for the researchers from different countries to present their findings on recent trend in Engineering & Science Domain. The discussions in the conference will be highly useful to students, teachers, scientists and industry working on these emerging trends.

I extend my best wishes to all the members of organizing committee to achieve a grand success.

With regards,

[Prof. (Dr.) Veerendra Kumar]

SURESH N. VIJAYWARGIA CHAIRMAN



People's Campus, Bhanpur, Bhopal- 462 037 (MP) India



Message

It is our pleasure to welcome all delegates to International Conference on "Emerging Trends in Technology and Science" (ICET²S-2017) organized by School of Research & Technology a constituent unit of People's University, Bhopal on March 02-04, 2017.

I hope this Conference will result in fruitful collaborations that will extend beyond the campus. Here I would like to thank to the sponsors, committee members and reviewers for their time and excellent work which leads to the success of this conference. Also we would like to express thanks to all the individuals for their efforts towards the successful completion of the proceedings.

I congratulate School of Research & Technology for taking this initiative and wish all the participants would have a great experience.

Suresh N. Vijaywargia Chairman, People's Group

Tel: +91 (0755) 4005207-02 Fax: 91 (0755) 4005554 E-mail: chairmanpeoplesgroup@gmail.com Website: www.peoplesgroup.in

Capt. Ambrish Sharma

Director

People's Campus, Bhanpur, Bhopal - 462037 (MP) INDIA



People's &

Nurturing Humanity through Health Education & Media Excellence

> I am glad that this is the first International Conference organized by "School of Research and Technology" (SORT), a constituent unit of People's University in collaboration with M.P. Council of Science & Technology. Sharing experiences today may lead to future collaborations that will hopefully generate new ideas essential to overcome current Technology limitations and solving application related problems. These conferences will provide a wonderful opportunity to the faculty to have wide exposure and to enhance knowledge and skills appropriate to their discipline which in turn improves the quality of their teaching and research.

> I congratulate the team of "School of Research and Technology" for taking this initiative and my appreciation for the commendable work put in by the faculty team for their efforts towards organizing this International Conference.

Capt Ambrish Sharma Director Peoples Group.

> Tel. : +91 (0755) 4005064 Fax : +91 (0755) 4005065 E-mail : ambrishsharma@peoplesgroup.in Website : www.peoplesgroup.in



PEOPLE'S UNIVERSITY (Established under MP Act No 17 of 2007)

DR. V.K. PANDYA M.D. VICE CHANCELLOR



Message

I welcome you to the International Conference on "Emerging Trends in Technology & Science" (ICET²S-2017).

The ICET²S-2017 provides a forum for the discussion of advances in recent research in the field of Emerging Trends in Technology & Science and provides possibilities for students and young engineers to meet the leading specialists to give their knowledge and experience to young beginning generation of future specialists.

I hope that this Conference under the aegis of People's University will provide opportunities to take a fresh look at the domain and conduct further deliberations on the emerging trends in the area. Detecting emerging trends will help the research scholars to pursue successful research, write proposals and seek funding besides creating performance metrics that will show the true impact of their work.

I wish to take this opportunity to extend to all our international partners and colleagues a warm welcome to People's University Bhopal. Take advantage of your presence in Bhopal to visit the University campus and various interesting tourists attractions within the University Campus and City environs.

Lastly, a special word of thanks goes to the Organizing Committee of the Conference for facilitating the hosting of this International Conference in Bhopal.I wish you every success in your deliberations at the conference.

Dr. V.K.Pandya Vice Chancellor People's University

People's Campus, Bhanpur, Bhopal-462037 (MP) India Phone : 0755-4005263, Fax : 0755-4005291 E-mail : vc@peoplesuniversity.edu.in, Website : www.peoplesgroup.in



PEOPLE'S UNIVERSITY

(Established by MP Act No. 18 of 2011 & approved u/s 2 (f) of UGC Act 1956)

ISO 9001 : 2008 Certified





I am delighted to learn and feel proud that School of Research and Technology a constituent unit of People's University, Bhopal is organizing an International Conference on "Emerging Trends in Technology & Science" (ICET²S-2017) a potential area offering wider scope for research and applications. I congratulate the organizing committee for planning and organizing this International Conference, which will provide a wonderful opportunity to the faculty to have wide exposure and to enhance knowledge and skills appropriate to their discipline which in turn improves the quality of their teaching and research.

I am sure that participation from international speakers, faculties, students and delegates from all over the country will provide a vital connect between alumni, academia and talented student community of the University.

I extend my warm greetings and felicitations to the organizers and participants and wish the Conference a great success.

Registrar **People's University**

People's Campus, Bhanpur, Bhopal - 462037 (M.P.) India Ph. +91 (0755) 4005291, 4005265 Fax +91 (0755) 4005293 E-mail: registrar@peopleuniversity.edu.in Website: www.peoplesuniversity.edu.in



PEOPLE'S UNIVERSITY

(Established by MP Act No. 18 of 2011 & approved u/s 2 (f) of UGC Act 1956

ISO 9001 : 2008 Certified

SCHOOL OF RESEARCH & TECHNOLOGY (Formerly known as People's College of Research & Technology)



Message

As Dean and Conference Convener, on behalf of "School of Research and Technology" People's University, I am delighted to welcome all to the International Conference on "Emerging Trends In Technology and Science" (ICET²S-2017) in Collaboration with M P Council of Science and Technology.

The conference covers approximately all the domains of Technology and Science. It aims to provide a unique opportunity for researchers, policy makers, and practitioners to answer some of the challenges and to outline new solutions for developing them.

I hope that this unique international and multidisciplinary conference will provide our participants with a truly transformative experience through a variety of knowledge and perspectives so that the complex problems in our society can be solved.

Dr. Keshavendra Choudhary Principal and Dean School of Research and Technology, People's University

People's Campus, Bhanpur, Bhopal - 462037 (M.P.) India Ph. +91(0755) 4005468 Fax : (0755) 4005467 E-mail: hoi.engg@peoplesuniversity.edu.in, Website: www.peoplesuniversity.edu.in

An Improved Hybrid DSTATCOM Topology to Compensate Reactive and Nonlinear Loads

Namrata Mishra¹,Sonam Mishra²

1.A.P,Bansal Institute of Research & Technology, Bhopal,mishra.namrata89@gmail.com 2. <u>A.P,Bansal Institute of Research & Technology, Bhopal sonammishra ex@yahoo.co.in</u>

Abstract-

With the increasing need of electrical energy, the demand for receiving the high quality electrical energy is being increased in distribution systems. But due to the different disturbances affecting the power qualiFty, the power quality in the present day distribution systems is deteriorated due to high reactive power burden, harmonic current, load unbalance, excessive neutral current etc. There are various power quality problems faced by utilities, industrial consumer, equipment like PLC (Programmable Logic Controller), & ASD (Adjustable Speed Drives). The different custom power devices are available for mitigation of power quality problems. DSTATCOM (Distribution Static Compensator) is one of the shunt connected devices used for compensating various power quality problems in distributed systems. This paper presents a comprehensive review of DSTATCOM configuration, topology & different control schemes used for power quality improvement in the distribution system incorporating multiple applications. Index Terms— custom power, dstatcom, power quality.

I. INTRODUCTION

POWER Quality (PQ) is a term which broadly refers to maintaining near sinusoidal waveform of power distribution bus voltages at rated voltage and frequency. Power Quality (PQ) related issues is of most concern nowadays. The widespread use of electronic equipment, such as information technology equipment, power electronics such as adjustable speed drives (ASD), programmable logic controllers (PLC), energy-efficient lighting, leads to a complete change of electric loads nature. These loads are simultaneously the major causes and the major victims of power quality problems. Due to their non-linearity, all these loads cause disturbances in the voltage waveform. Various Power Quality (PQ) problems affecting industrial customers thus affecting industrial production process leading to revenue loss. Various methods have been applied to reduce or mitigate the PQ problems. The conventional methods are by using capacitor banks, introduction of new parallel feeders and by installing uninterruptible power supplies. (UPS). However, the PQ problems are not solved completely due to uncontrollable reactive power compensation and high costs of new feeders and UPS. Conventionally, Static Var Compensators (SVCs) have been used in conjunction with passive filters at the distribution Level for reactive power compensation and mitigation of the power quality problem. Though SVCs are very effective system controllers used to provide reactive power compensation at the transmission level, their limited bandwidth, higher passive element count that increases size and losses, and slower

response make them unsuitable for the modern day distribution requirement. Another compensating system has been proposed by employing a combination of SVC and active power filter, which can compensate three phase loads in a minimum of two cycles. Thus, a controller which continuously monitors the load voltages and currents to determine the right amount of compensation required by the system and the less response time should be a viable alternative. Distributed Static Compensator (DSTATCOM) has the capacity to overcome the above drawbacks by providing precise control and fast response during transient and steady state, with reduced footprint and weight. The DSTATCOM has emerged as a promising device to provide solution not only for voltage related issues but a host of other current related power quality problem's solutions such as voltage regulation, load balancing, reactive power compensation, power factor correction & improvement and current harmonic control This paper aims at presenting a comprehensive review of DSTATCOM for power quality improvement in the distribution system. This paper covers the different configurations used, the control methodologies, and their selection for specific applications.

II. TOPOLOGIES & CONFIGURATIONS

DSTATCOM can be classified on the basis of different topologies and the number of phases. For power quality improvement the voltage source inverter (VSI) bridge structure is generally used while the use of a current source inverter (CSI) is less. The different types of configuration of DSTATCOM are as follows

A. Converter based Classification

DSTATCOM utilizes either a voltage-source inverter (VSI) or a current-source inverter (CSI). VSI uses capacitive energy storage, while CSI uses inductive energy storage in their respective DC links for voltage and current However, the voltage source inverters are

widely used due to the smaller size, the less heat dissipated and the less cost of the capacitor compared to the inductor, used in the CSI, for the same power rating. The VSI connected in shunt with the AC system provides multifunctional topology which can be used for up to three quite distinct purposes, voltage regulation and compensation of reactive power, correction of power factor; and elimination of current harmonics. Voltage source inverter (VSI) topology is popular because it can be expandable to multi level, multistep & matching topology to enhance the performance with lower switching frequency and increased power handling capacity. Various multilevel topologies are NPC/Diode clamp multilevel inverter, Cascaded H-bridge & Flying capacitor multilevel inverter are as shown in Fig.1(a,b,c) & further a cascaded modular multilevel inverter.



Figure 1. Topologies of multilevel inverter (5-level) Diode clamp multilevel inverter, cascaded H-bridge multilevel INVERTER, Flying capacitor multilevel inverter.

1) Diode clamped multilevel inverter:

m-level diode-clamp converter typically have (m - 1) capacitors on the DC bus and produces m levels of the phase voltage. A single-phase full bridge 5-level diode clamp converter in which the DC bus consists of four capacitors $C_{1}, C_{2}, C_{3}, \text{and } C_{4}$. For a DC bus voltage *V*dc, the voltage across each capacitor is $V_{dc}/4$ and each device voltage stress will be limited to one capacitor voltage level, $V_{d}/4$, through clamping diodes.

2) Cascade H -bridge multilevel inverter:

In Cascaded H-bridge inverters separate DC sources (SDC's) are introduced. This new converter can avoid extra clamping diodes or voltage balancing capacitors. Fig.1 (b) Shows the basic structure of the 5-level cascaded-inverters with SDC's, shown in a single-phase configuration. Each SDC is associated with a single To synthesize a multilevel waveform, the AC output of each of the different level H- bridge cells is connected in series. The number of output phase voltage levels in a cascaded inverter is defined by m = 2H + 1, where H = no. of H-bridges; while the relation between the phase voltage and line voltages is same as diode –clamped inverter.

3) Flying capacitor multilevel inverter:

A single phase full-bridge flying-capacitor based 5-level converter is shown in Fig.1 (c), assuming that each capacitor has the same voltage rating. Three inner-loop balancing capacitors for phase leg a, Ca1,2, and Ca3 are independent from those for phase leg. All phase legs share the same DC link capacitors C1-C4. The voltage level defined in the flying-capacitor converter is similar to that (1). The phase voltage of an m-level converter has levels including the reference level, and the line voltage has (2m - 1) levels. Assuming that each capacitor has the same voltage rating as the switching device, the DC bus needs (m - 1) capacitors for a m-level converter

B. Topology based Classification

DSTATCOM is a shunt connected compensating device. Suitable adjustment of the phase and magnitude of the DSTATCOM output voltages allows effective control of active and reactive power exchanges between the D-STATCOM and the AC system. Such configuration allows the device to absorb or generate controllable active and reactive power. The VSC connected in shunt with the AC system provides a multifunctional topology which can be used for up to three quite distinct purposes-

(Load Compensation):

1) Voltage regulation and reactive power compensation.

2) Correction of power factor (UPF-Unity Power Factor)

3) Load balancing

There are various topologies of the VSI (Voltage Source Inverter) used in DSTATCOM is as follows

1) H-bridge VSI topology:

The H-bridge VSI topology shown in Fig. 2, which is commonly used for load compensation, consists of 12 power semiconductor switches supported by a common

DC storage capacitor for 3-phase [5] -[8]. Each VSI is



Figure 2. H-bridge topology for 3-phase 3-wire DSTATCOM.

Connected to the power network at the PCC through a transformer. The purpose of this transformer is to provide isolation between the inverter legs and to prevent the DC

Storage capacitor from being shorted by switches in different inverter legs. Due to the presence of isolation transformers, this topology, however, is not suitable for compensation of the load currents containing DC components.

2) Three-phase three-leg topology:

A three-phase three-leg topology shown in Fig. 3 has six switches and a common DC storage capacitor [7] -[9]. If this topology is used, the zero-sequence current in the load cannot be compensated, and it flows in the neutral wire between the system and load. The zero-sequence current thus returns to the AC distribution system. Furthermore, if the load is nonlinear, then the harmonics enter into the AC system, thus degrading the power quality. In this topology, the generations of the three compensator currents are not independent. Hence, this scheme is no suitable for a three-phase four-wire distribution system with loads containing zero-sequence currents.

3) Three-phase four-leg VSI topology:

Three-phase four-leg VSI topology shown in Fig. 4 is suitable for the elimination of dc as well as zero-sequence components from the source currents. Three of its legs are connected to three phases, and the fourth leg is connected to the neutral through an interface reactor [9] –[11]. Reference current for the fourth leg is the negative sum of the three-phase load currents. This nullifies the effect of DC components in the load currents. When a compensator is working, the

zero-sequence current containing switching frequency components are routed between the load and compensator neutral



Figure 3. Three-phase, 3-leg DSTATCOM.



Figure 4. Three-phase, 4-leg DSTATCOM.

4) Neutral-clamped VSI topology:

A neutral-clamped VSI topology shown in Fig. 5. Consists of eight IGBT switches and two identical DC storage capacitors for 3-phase. This topology is well equipped to compensate DC components present in the load. However, due to the presence of this DC component, the two DC capacitors are charged to different voltages.

III. CONTROL STRATEGIES

Satisfactory performance, fast response, flexible and easy implementation are the main objectives of any compensation strategy. The control strategies of a DSTATCOM are mainly implemented in the following steps:

- Measurements of system variables and signal conditioning
- Extraction of reference compensating signals
- Generation of firing pulses for switching devices

The generation of proper pulse width modulation (PWM) firing is the most important part of DSTATCOM control and it has a great impact on its compensation objectives, transient as well as

steady state performance. A PWM based distribution static compensator offers faster response and capabilities for harmonic elimination [18]. This section discusses the following control schemes of a DSTATCOM for power factor correction and harmonic mitigation based on

- 1) Phase shift control
- 2) Indirect decoupled current control
- 3) Regulation of AC bus and DC link voltage

1) Phase shift control:

In this method, the compensation is achieved by the measuring of the rms voltage at the load point, whereas no reactive power measurements are required [19] -[20]. The sinusoidal PWM technique is used to con-Stant switching frequency. The error signal obtained by comparing the measured system rms voltage and the reference voltage is fed to a proportional integral (PI) controller, which generates the angle for deciding the necessary phase shift between the output voltage of the VSI and the AC terminal voltage. This angle is summed with the phase angle of the balanced supply voltages, assumed to be equally spaced at 120 degrees, to produce the desired synchronizing signal required to operate the PWM generator. In this scheme, the DC voltage is maintained constant, using a separate battery source. Though this strategy is easy to implement, is robust and can provide partial reactive power compensation without harmonic suppression

2) Indirect decoupled current control:

This scheme is based on the governing equations of advanced static var compensator [21]. It requires the measurement of instantaneous values of three phase line voltages and current. The control scheme is based on the transformation of the three phase system to a synchronously rotating frame, using Park's transformation. The compensation is achieved by the control of i_d and iq. This is an indirect current control method, where current error compensation is achieved indirectly through voltage modulation, in order to incorporate simple open loop sine PWM modulators, so that fixed switching frequency is achieved. The main advantage of this scheme is that, it incorporates a self supporting DC bus and the value of the reference DC link voltage is less, as compared to phase shift control, due to which the converter switches are less stressed. Also, another advantage of this scheme is that it operates with a fixed switching frequency, which provides a definite harmonic spectrum, independent of the load. The disadvantages of this scheme are:

- Phase Locked Loop gives erroneous results in case of distorted mains and is applicable for only three phase systems.
- It requires intensive computation, including complex transformations, making the complex operation.
- Bandwidth is restricted due to the use of sine

PWM generator & during transient condition the supply current shoots to a very high value.

3) Regulation of AC bus and DC link voltage:

Three phase AC supply voltages and DC link voltage are sensed and fed to two PI controllers, the outputs of which decide the amplitude of reactive and active current to be

generated by the DSTATCOM [23]. Multiplication of these amplitudes with the in phase and quadrature voltage

Unit vectors yield the respective component of the reference currents. When applying the algorithm for power factor correction and harmonic elimination, the quadrature component of the reference current makes zero. These reference currents and the sensed line currents

are fed to a hysteresis controller, which is used for tracking control as shown in Fig. 8 (a). This hysteresis controller adds a hysteresis band +/-h around the calculated reference current. The tracking becomes better if the Hysteresis band is narrower, but the switching frequency is increased, which results in increased switching losses. Therefore, the choice of hysteresis band should be a compromise between tracking error and inverter losses. This method of tracking current control is simple and robust and it exhibits an automatic current limiting characteristic.

IV. CONCLUSION

An extensive review of compensating custom power device DSTATCOM has been presented to provide a clear perspective on various aspects of the device to the researchers, engineers and manufacturers. The substantial increase in the use of solid –state power control results in harmonic pollution above the tolerable limits. The presented classification of configurations, topology and control strategies provide compensation solution to the various power quality problems, viz, voltage and current harmonics, voltage sags/ swells, voltage flicker, voltage regulation, load balancing, & reactive power compensation & etc.

REFERENCES

[1] R. C. Dugan, M. F. McGranaghan, and H. W. Beaty, Electrical Power System Quality McGraw Hill Companies, Inc., 1996.

[2] G.F. Reed, M. Takeda, and I. Lydia, —Improved power quality solution using advanced solid-slate switching and static compensation technologies, II IEEE Power Engineering Society winter Meeting, New York, NY, USA, vol. 2, pp. 1132-1137, 1999.

[3] Y. Ye, M. Kazerani, and V. Quintana, —Current-source converter based statcom: Modeling and control, II IEEE Trans. Power Del., vol. 20, no.2, pp. 795–800, Apr. 2005.

[4] M. Mishra, A. Ghosh, and A. Joshi, —Operation of a DSTATCOM in voltage control mode, II IEEE Trans. Power Del., vol. 18, no. 1, pp. 258–264, Jan. 2003.

[5] A. Ghosh and A. Joshi, —The use of instantaneous symmetrical components for balancing a delta connected load and power factor correction, I Elect. Power Syst. Res., vol. 54, no. 1, pp. 67–74, Apr. 2000.

[6] A. Ghosh and A. Joshi, —A new approach to load balancing and power factor correction in power distribution system, I IEEE Trans. Power Del., vol. 15, no. 1, pp. 417–422, Jan 2000.

[7] S. P. Gawande, K. B. Porate, K. L. Thakre, and G. L. Both —Synchronization of synchronous generator & induction generator for voltage & frequency stability using STATCOMI in Proc.3rd IEEE Conf. ICETET, 2010, pp. 407-412.

[8] S. P. Gawande and K. B. Porate — Review of parallel operation of synchronous generator and induction generator for stability, II in Proc.2rdIEEE Conf. ICETET, December 2009, pp. 716-721.

[9] S. Iyer, A. Ghosh, and A. Joshi, —Inverter topologies for DSTATCOM applications—A simulation study, Elect. Power Syst. Res., vol. 75, no. 2-3, pp. 161–170, Aug 2005.

[10] B. Singh, A. Saxena, and D. P. Kothari, —A novel control of four pole voltage source inverter for active filtering of nonlinear loads in 3-phase 4-wire systems, I in Proc. Power Electron. Drives Energy Syst. Ind. Growth Conf., 1998, pp. 201–206.

[11] M. K. Mishra and K. Karthikeyan —An investigation of design and switching dynamics of a voltage source inverter to compensate unbalanced and non linear load, I IEEE Trans. On IND. Electronics vol. 56, no. 8, pp. 2802-2810, august 2008.

[12] A. Ghosh and G. Ledwich, Power Quality Enhancement Using Custom Power Devices: Kluwer Academic Publishers, London 2002.

[13] N. G. Ingorani and L. Gyugyi, —Understanding FACTS, II IEEE Press, 2000.

Fault Analysis and Control for a Grid Connected Photovoltaic System

Manish Kethoriya¹, Lokesh Shukla².

Assistant Professor, SORT, Peoples University Bhopal M P <u>erkethoriyamanish@gmail.com</u>
Assistant Professor, SORT, Peoples University Bhopal MP <u>er.lokesh27@gmail.com</u>

Abstract:

A new method of current control strategy for grid connected photovoltaic (PV) system is presented in this paper. The connection of photovoltaic system with the grid is a difficult task as the solar irradiation is a nonlinear quantity. The objective of this work is to develop a model of the photovoltaic system with maximum power point tracking (MPPT) system connected to 11 KV grid by implementing new control technique so that maximum active power transfer from PV to grid can be taken place without injection of harmonics. The considered system consists of a PV system, MPPT controller, boost converter, voltage source inverter (VSI), 3-Φ filter, a control system, a distribution network, load and grid. The proposed control of the three-phase gridconnected solar PV system is designed in the synchronously-rotating d-q reference frame. Here, Vdc is measured, then compared with Vdcref and accordingly the error is fed to proportionalintegral (PI) controller from which Idref is generated.

There after the final model is simulated by using MATLAB/SIMULINK and different output waveforms are analyzed for different conditions. Finally the fault analysis is carried out to observe the behavior of the system.

Keywords: Grid-connected PV System, MPPT, Voltage Source Inverter (VSI), PWM Technique,

I. INTRODUCTION

Recently Govt. of India has started focusing more on renewable energy source addition into the distribution network. In India there is enormous shortage of power and at the same time, there are sample possibilities of PV solar application, grid connected and off-grid both

Many researchers achieved promising results from modeling simulation control for grid connected photovoltaic system and fault analysis the performance of the system, comparison.

II. BACKGROUND TO THE RESEARCH

There are two main concepts that need to be introduced before proceeding with the Research, these are: Solar Energy and Grid Connected PV Systems.



Fig: Basic PV Systems

Energy is the most basic and essential of all resources. All the energy we use on earth comes from fission or fusion of atomic nuclei or from energy stored in the Earth. A lot of research has been done in the area of unlimited energy resources such as solar power generation and solar energy transformation. These most effective and harmless energy is solar energy. The use of solar energy instead of fossil fuel combustions particular in areas of simple applications like low to medium water heating or battery charging can reduce the load of harmful emissions to the environment. This energy can be harvested by use of photovoltaic (PV) arrays. The photovoltaic generation systems can either be operated as isolated systems or be connected to the grid as a part of an integrated system, with other electrical generation, they form the distributed generation system solar energy into electricity which can be easily transported and converted to other forms for the daily life use. In the PV system there are semiconductors which are in form of cells, panels, modules and arrays to collect and convert the sunlight into direct current.

III. PHOTOVOLTAIC SOLAR SYSTEM

Sunlight can be directly converted into convert's sun light into electric current using the photoelectric effect. This usually requires conversion to certain desired voltages or alternating current (AC), which requires connected inside the modules. Modules are wired together to form arrays, then tied to inverter, which produces power with the desired voltage and frequency/phase (when it's AC). Many residential systems grid. In these grid connected PV systems, use of energy storage are optional. Sometimes there are batteries or

Additional power generators are often added as back up's, which form stand alone power systems. The physical of PV cell is very similar to that of the classical diode with a p material. When the junction absorbs light, the energy of absorbed photon is transferred to the electron of the material, creating charge carriers that are separate a potential gradient, get accelerated under the electric field, and circulate as current through an external circuit. The solar cell is the basic building of the PV power system it numerous such cell are connected in series and parallel circuits on a panel (module), The solar array or panel is a group of a several modules electrically connected in series parallel combination to generate and voltage. One cell of PV module we used is a low rated current I rated=100mA. In general, the equivalent models of solar cells have three types:

- (1) An ideal model with one current source and diode just.
- (2) An extra small resistor to simulate the line loss.
- (3) A big internal resistor to realize the solar cells

IV. GRID CONNECTED PHOTOVOLTAIC SYSTEMS

The continuously increasing energy consumption overloads the distribution grids as well as the power stations, therefore having a negative impact on power availability, security and quality [1]. One of the solutions for overcoming this is the Distributed Generation (DG) systems. DG systems using renewable energy sources like solar or wind have the advantage that the power is produced in close proximity to where it is consumed minimizing the loss due to transmission lines.

V. PROBLEMS PERCEIVED IN THIS AREA

The efficiency of commercial PV panels is around 15-20%. Therefore, it is very important that the power produced by these panels is not wasted, by using inefficient power electronics systems. The efficiency and reliability of both single-phase and three phase PV inverter systems can be improved using transformer less topologies and maximum power point tracking methods. Simulation of modern electrical systems using power electronics has always been a challenge because of the nonlinear behavior of power switches, their connection to continuous sub-systems and the design of discrete-time control. Nowadays, more and more complex systems are studied for designing efficient control strategies, such as renewable energy conversion systems whole traction systems and so on. In these cases

Efficient simulations before practical control implantation are required. Furthermore very few systems address the three main problems in PV Inverter design. The researchers are either focused on simulating an accurate PV cell or in optimizing an MPPT model or designing a control for the inverter synchronization. Our research will approach the three problems first individually then integrate all the systems.

REFERENCES

- [1] G. Farivar, B. Asaei, "A New Approach for Solar Module Temperature Estimation using the Simple Diode Model", IEEE Transactions on Energy Conversion, Vol.26, No.4, Dec. 2011, pp.1118-1126.
- [2] M. F. Schonardie, D. C. Martins, "Application of the dq0 Transformation in the Three-Phase Grid-Connected PV Systems with Active and Reactive Power Control", IEEE International Conference on Sustainable Energy Technologies, Singapore, 2008, pp. 18-23.
- [3] W. Cai, H. Ren, Y. Jiao, M. Cai, X. Cheng, "Analysis and Simulation for Grid-Connected Photovoltaic System based on MATLAB", International Conference on Electrical and Control Engineering (ICECE), Yichang, 2011, pp.63-66.
- [4] A. Yazdani, P. P. Dash, "A Control Methodology and Characterization of Dynamics for a Photovoltaic (PV) System Interfaced with a Distribution Network" IEEE Transactions on Power Delivery, Vol.24, No.3, July 2009, pp.1538-1551.

- [5] F. Blaabjerg, R. Teodorescu, M. Liserre, A. V. Timbus, "Overview of Control and Grid Synchronization for Distributed Power Generation Systems", IEEE Transactions on Industrial Electronics, Vol.53, No.5, Oct. 2006, pp.1398-1409.
- [6] R. Sunny, R. Anto, "Harmonics Control and Performance Analysis of a Grid-Connected Photovoltaic System", International Conference on Advanced Computing and Communication Systems (ICACCS), Coimbatore, 2013, pp. 1-6.
- [7] Z. Dejia, Z. Zhengming, M. Eltawil, Y. Liqiang, "Design and Control of a Three-Phase Grid-Connected Photovoltaic System with Developed Maximum Power Point Tracking", Twenty-Third Annual IEEE Applied Power Electronics Conference and Exposition, Austin, TX, 2008, pp.973-979.
- [8] S. Meshram, G. Agnihotri, S. Gupta, "An Efficient Constant Current Controller for PV Solar Power Generator Integrated with the Grid", Fifth IEEE Power India Conference, Murthal, 2012, pp.1-6.
- [9] J. M. Carrasco, L. G. Franquelo, J. T. Bialasiewicz, E. Galvan, R. C. P. Guisado, M. A. M. Prats, J. I. Leon, N. MorenoAlfonso, "Power Electronic Systems for the Grid Integration of Renewable Energy Sources: A survey", IEEE Trans.on Ind. Electron, Vol.53, No.4, Aug. 2006, pp.1002–1016.
- [10] J. H. R. Enslin, P. J. M. Heskes, "Harmonic Interaction between a Large Number of Distributed Power Inverters and the Distribution Network", IEEE Trans. on Power Electron, Vol.19, No.6, Nov. 2004, pp.1586–1593.
- [11]N. Srisaen, A. Sangswang, "Effect of PV Grid-Connected System Location on a Distribution System", Proc. Of IEEE Asia Pacific Conf. on Circuit and Systems, Dec. 2006, pp.852–855.
- [12]B. K. Naik, M. Das, T. K. Chatterjee, K. Chatterjee, "Study and implementation of synchronization algorithm in three phase grid connected PV system", 3rd International Conference on Recent Advances in Information Technology (RAIT), Dhanbad, 2016, pp.304-309.
- [13] American Journal of Electrical Power and Energy Systems 2016; 5(4): 35-44
Overload Alleviation Using Particle Swarm Optimization: A Review

Sudhir Giri¹, Sweta Lall², PriyankaKushwaha³

Sagar Institute of Research, Technology & Science RGPV, BHOPAL, <u>Sudhir.giri2008@gmail.com</u>,
 School of Research & Technology, PU,Bhopal, <u>sweta.lall85@gmail.com</u>
 School of Research & Technology, PU,Bhopal, <u>priyanka.kushwaha17@gmail.com</u>

Abstract

Power system is a major and complex system, whose operating condition may not always have an unvarying value. The emergency state may occur in a power system as a consequence of unexpected contingencies. This state may result in some problems such as line overloading, voltage collapse and angle instability. Over-loading is a problem which leads to emergency and extreme emergency states in which the system is driven toward collapse. During an emergency situation, system operators are required to do rescheduling of active power of generators and load shedding decisions on system security concerns such as voltage, current, power and frequency constraints, to alleviate constraints and maintain system stability. This paper summarizes the alleviation of overloaded transmission lines during contingency conditions using PSO, one of the evolutionary programming techniques. PSO has emerged as a useful optimization tool for handling nonlinear programming problems.

Keywords— PSO, congestion management, overload alleviation, load shedding.

I.INTRODUCTION

Alleviating overload transmission line in the emergency condition is a decisive problem in power system operation. For secure operation of power system, the network loading has to be maintained within specified limits. Hence, the operator has to maintain the security level by proper analysis and reschedule the system accordingly. For this purpose several meta-heuristic optimization techniques have been adopted to obtain the optimal solution for the overload alleviation problem. In this paper a brief review on overload alleviation techniques based on PSO and it's comparison with other techniques is given.

II.OVERLOAD ALLEVIATION PROBLEM

As a power system configuration undergoes frequent changes due to contingencies and disturbances. If the power system survives after the disturbance, it will be operating in a new steady state in which one or more transmission lines may be overloaded. The possible corrective control actions are shifting generation to redistribute power flows, switching the transmission network, change of effective phase displacement between the input voltage and the output voltage of a transmission line and load shedding. The use of phase shifting transformers, line switching and load shedding leads to additional reserves and interruption of power supply. The real power generation rescheduling is the most widely used control for network overload alleviation. This is due to no need of additional reserves and ease of control. Particle Swarm optimization is used to solve the overload alleviation problem by considering all power system constraints.

III. PROBLEM FORMULATION

Problem formulation involves formulation of objective function either as single objective or multiobjective function such as elimination of transmission lines over loadings in contingency condition, minimization of sum of curtailed load during generation outage conditions, minimization of generation cost, maximization of social welfare, minimization of installation cost of FACTS devices etc. Such objective functions have to be optimized by using appropriate optimization technique while satisfying the operational and security related constraints.

IV.PARTICLE SWARM OPTIMIZATION

Particle swarm optimization is a form of evolutionary computation technique first introduced by James Kennedy (Social-psychologist) and Russell Eberhart (Electrical Engineer) [1] in 1995 inspired from the social behavior and dynamic movements with communication of organisms such as insects, fish schooling and bird flocking. PSO is a population-based evolutionary technique that has many advantages over other optimization techniques. Each individual potential solution in PSO is called particle. Each particle in a swarm flies around in a multidimensional search space based on its own experience and experience of neighboring particles. Let, define the search space S in n-dimension and the swarm consists of N particles. Let, at instant t, particle i have its position defined by $X_t^i = \{x_1^i, x_2^i, \dots, x_n^i\}$ and velocity by $V_t^i = \{v_1^i, v_2^i, \dots, v_n^i\}$ in variable space S. Velocity and position of each particle in the next generation can be calculated as:

$$V_{t+1}^{i} = w \times V_{t}^{i} + c1 \times rand() \times (P_{t}^{i} - X_{t}^{i}) + c2 \times rand() \times (P_{t}^{g} - X_{t}^{i})$$

$$X_{t+1}^i = X_t^i + V_{t+1}^i \quad \forall i = 1, 2 \dots N$$

where

Ν	number	of	particles	in	the	swarm;
		•••				•••••

w inertia weight;

*c*1, *c*2 acceleration constants;

rand () uniform random value between 0 to 1;

 P_t^g global best at generation *t*,

 P_t^i best position that particle *i* could find so far.

 V_t^i is the velocity of *i* th particle at iteration t must lie in the range.

 $Vmin \leq V_t^i \leq Vmax$

where,

Vmax – maximum velocity *Vmin* – minimum velocity. The parameter Vmax determines the resolution, or fitness, with which regions are to be searched between the present position and the target position. If Vmax is too high, particles may fly past good solutions. If Vmin is too small, particles may not explore sufficiently beyond local solutions. The constants C1 and C2 pull each particle toward pbest and gbest positions. Suitable selection of inertia weight w provides a balance between global and local explorations, thus requiring less iteration on average to find a sufficiently optimal solution. In general, the inertia weight w is set according to the following equation.

$$w(t) = w_{min} + (w_{max} - w_{min}) \cdot e^{-\left[\frac{MAXITER}{10}\right]}$$

Where,

w= inertia weighting factor,

 w_{max} = maximum value of weighting factor,

 w_{min} = minimum value of weighting factor,

MAXITER = maximum number of iterations and

t = current number of iteration.

V. ADVANTAGES OF **PSO**

PSO has key advantages over other similar optimization techniques are as follows: PSO is easier to implement and there are fewer parameters to adjust.

- 1. In PSO, every particle remembers its own previous best value as well as the neighborhood best; therefore, it has a more effective memory as compared to other techniques like GA.
- 2. PSO is more efficient in maintaining the diversity of the swarm , since all the particles use the information related to the most successful particle in order to improve themselves, whereas in GA.
- 3. PSO has derivative-free property unlike many conventional techniques
- 4. Lower sensitivity to the nature of the objective function.
- 5. PSO algorithm updates the velocity vector for each particle and then adds that velocity to the particle position or values.

VI. REVIEW FOR EVOLUTIONARY TECHNIQUE IN ALLEVIATING OVERLOAD

J. Kennedy and Eberhart [1] described the Particle Swarm Optimization (PSO) concept briefly reviewing the stages of its development from social simulation to optimize and discussed application and advantages of the Algorithm.

Y. Del Valle et al. [2] described the basic concepts of PSO technique and its numerous variants, as well as its applications to power system optimization problems. Also, it provides a

comprehensive survey on the power system applications that have benefited from the powerful nature of PSO as an optimization technique.

Y. Shi [3] surveyed the research and development of PSO in five categories viz. algorithms, topology, parameters, hybrid PSO, algorithms, and applications.

S. Balaraman et al. [4] proposed an efficient method for transmission line over load alleviation in deregulated power system using real coded genetic algorithm (RCGA). and an attempt is made to explore the use of real coded genetic algorithm to find the optimal generation rescheduling for relieving congestion and the line overloads are relieved completely by generation rescheduling alone without any load curtailment.

Manoj Kumar Maharana et al. [5] presented novel corrective control strategies or actions of load generation rescheduling and load shedding with subject to contingencies to alleviate overloads in transmission lines by the Particle Swarm Optimization (PSO) technique.

K. Pandirajan et. al [6] proposed and presented a fuzzy ranking based non-dominated sorting genetic algorithm-II for overload management by generation rescheduling in a contingent power network. The proposed fuzzy based NSGA-II algorithm is capable to handle three different competing objectives generation cost, transmission line overload and real power loss and provides a set of non-dominated pareto-optimal solutions. The proposed method has been tested and examined on the standard IEEE-30 and IEEE 118 bus systems.

K. Pandirajan et. al [7] proposed an Adaptive Neuro-Fuzzy Inference System (ANFIS) based generation reschedule to alleviate transmission line overloads. The effectiveness of the proposed approach has been tested for modified IEEE 30 bus system, 39 bus New England system and modified IEEE 57 bus system in MATLAB environment and the proposed ANFIS approach was well proved its ability to remove the overloaded lines with a minimum number of iterations and minimum rescheduling cost when compared to fuzzy logic based approach.

Sujatha Balaraman et. al [8] presented an algorithm for congestion management and line overload alleviation in a pool based electricity market using particle swarm optimization. The proposed approach effectively relieves the congestion with minimum shifts in generation real power and relieves line overload due to sudden load variations and unexpected line outage. The proposed method is tested with various line outage, generator outage, transformer outage and load variations.

Manasarani Mandala et. al [9] proposed an optimal congestion management approach under hybrid electricity market using Self organizing hierarchical particle swarm optimization with Time Varying Acceleration Coefficients (SPSO-TVAC). The aim of the proposed work is to minimize deviations from preferred transaction schedules and hence the congestion cost under hybrid electricity market.

A. Shandilya et. al [10] presented a method for rescheduling of generators and load shedding to line overloads alleviation, with the help of a local optimisation concept. In the method, the new secure operating point is obtained for all line overload cases efficiently, and a significantly smaller

amount of load shedding is required. The proposed method is an aid to the load dispatcher and will find extensive applications in operational planning, security studies and the reliability evaluation of power systems. Tests was carried out for the 14-bus, 118-bus IEEE test systems, 6-bus and 26-bus SPC systems, and the 64-bus model of the North-West power system of India and are presented to show the effectiveness of the method.

Mehrdad Tarfdar Hagh et. al [11] proposed a new method, the sequential use of LP and PSO, which is faster than PSO and considered all constraints. The test carried out for IEEE 14 bus test system and compared the performance of the mentioned methods and a comparison of the proposed algorithm and genetic algorithm is accomplished.

T.K.P.Medicherla et. al [12] deal with the problem of alleviating line overloads in a power system by generation rescheduling and load shedding and developed atechniques to determine the generation rescheduling and load curtailment pattern to alleviate line loads. To consider the line overload problem, mathematical models based on linearized relationships between line currents and state variables, and bus injected powers and state variables are systematically developed. Two algorithms are described to solve the models in the Newton-Raphson (NR) and decoupled load flow programs. The approaches presented in this paper should prove useful in system security studies and reliability studies for examining line overload alleviation with minimum computational expense. The analytical results can a serve as an operating guide to the system dispatcher and the effectiveness of these techniques in alleviating line overloads in several test systems is investigated.

Manoj Kumar Maharana et. al [13] presented a new technique for selection of participating generators and load buses using direct acyclic graph (DAG). PSO technique solved the generator rescheduling or load shedding optimisation problem with in security constraints. The demonstration is carried out using the proposed approach for different contingency cases in IEEE 30 and 57 bus systems. The result shows that the proposed approach is computationally effectively fast, efficient, and reliable in restoring the system to normal state after a contingency with minimal control actions and strategies.

Tulika Bhattacharjee et. al [14] proposed the congestion management approach based on PSO is efficiently minimizing the congestion management cost and focused on demonstrating the role of demand side participation in Congestion Management Demand Side Bidding (DSB) is considered during both market clearing and Congestion Management phases. The congestion problem is modelled as an optimization problem and solved by particle swarm optimization (PSO) technique. The test has been carried out on IEEE 30-bus system successfully and test results on the IEEE 30-bus system prove the effectiveness of the proposed method in managing transmission congestion in a deregulated power system.

S. R. Biswal et. al [15] presented a algorithm for congestion management (CM) by optimal rescheduling of active powers of generators and power consumption of load. In addition to this, demand-side participation through load curtailment has been considered to manage congestion. Particle Swarm Optimization (PSO) is used to solve the Optimal Power Flow (OPF) problem formulated. The test has been carried out on IEEE-30 bus System and it was seen that the proposed technique is effectively minimizing the Congestion Management cost in alleviating congestion in the transmission lines.

Harish.R et. al [16] proposed the Genetic Algorithm based rescheduling of generators for alleviation of congestion. The GA is one of the optimization techniques which are based on the nature of the chromosomes. The proposed method's results were tested on the standard IEEE 30 bus system in MATLAB. Hence, to find the stress on the power system due to congestion, the Severity Index can be used. The fitness value for the individuals are selected and based on that, the problem has solved which has the objective function of minimization of change in real power and is subjected to several constraints. It is also found that GA gives generator rescheduling values almost accurately. Hence the proposed technique completely alleviates overloading of lines for all the cases considered in this study.

N. Chidambararaj et. al [17] proposed an efficient method for transmission line over load alleviation in deregulated power system. In this work, Congestion management problem has been solved using optimal rescheduling of active powers of generators selected based on the generator sensitivity to the congested line, utilizing CS Algorithm. The quality and usefulness of the algorithm is tested on IEEE 30-bus system The results show that CS Algorithm is giving the best optimal solution in comparison with PSO algorithms with respect to cost and runtime for relieving congestion in the congested line.

K. Vijayakumar [18] proposed the two effective methods for transmission congestion alleviation in deregulated power system. Congestion or overload in transmission networks is alleviated by rescheduling of generators and/or load shedding. The multi-objective fuzzy evolutionary programming (FEP) and nondominated sorting genetic algorithm II methods are used to solve this problem. The proposed methods give an efficient and reliable algorithm for line overload alleviation due to critical line outages in a deregulated power markets. The proposed algorithm is tested on IEEE 30 bus system.

VII.CONCLUSION

Present power system is undergoing restructuring and emerged in the form of electricity market. Due to market environment the congestion is more likely to occur in the transmission system so proper technique should be adopted to alleviate transmission overloading during contingency conditions. This is a review work to explore and dig into the application of evolutionary programming technique particularly in overloading alleviation problem techniques. The work firstly focused on alleviating overloads problem formulation than the working methodology and advantages of PSO is hashed out for alleviating overload during contingency conditions using evolutionary techniques and other techniques is given.

REFERENCES

- [1] Kennedy, J. and Eberhart, R., 1995, "Particle Swarm Optimization," Proceeding of IEEE, International Conference in Neural Network, Perth, Austrlia, pp. 1942-1948.
- [2] Y.del Valle, G.K. Venayagamoorthy, S. Mohagheghi, J.-C. Hernandez, R.G. Harley, "Particle swarm optimization: basic concepts, variants and applications in power systems", IEEE Transactions on Evolutionary Computation, vol.12, no.2,pp.171–195,2008.
- [3] Y. Shi, "Particle swarm optimization", in proc. IEEE Neural Networks Society, pp.8–13, 2004.
- [4] Sujatha Balaraman and N Kamaraj, "Congestion Management in Degregulated power system using real coded genetic algorithm", International Journal of Engineering Science and Technology, Vol. 2(11), 2010, 6681-6690.
- [5] Manoj Kumar Maharana and K. Shanti Swarup," A Corrective Strategy to Alleviate Overloading in Transmission Lines Based on Particle Swarm Optimization Method" The Journal of Engineering Research Vol. 7, No. 1, (2010) 31-4.
- [6] K. Pandiarajan and C.K. Babulal, "Fuzzy ranking based non-dominated sorting genetic algorithm-II for network overload alleviation", Archives of Electrical Enginnering, VOL. 63(3), pp. 367-384 (2014).
- [7] K. Pandiarajan and C K babulal, "An ANFIS Approach for Overload Alleviation in Electric Power System", J Electrical System 10 – 2 (2014): 179 -193.
- [8] Sujatha Balaraman and N Kamaraj, "Transmission Congestion Management Using Particle Swarm Optimization", J. Electrical Systems 7-1 (2011): 54-70.
- [9] Manasarani Mandala and C.P.Gupta, "Congestion Management under Hybrid Electricity Market using Selforganizing Hierarchical Particle Swarm Optimization", International Journal of Computer Applications (0975 – 8887), Volume 82 – No 17, November 2013.
- [10] A. Shandilya, H. Gupta, J. Sharma, "Method for generation rescheduling and load shedding to alleviate line overloads using local optimization", IEE Proceedings Generation, Transmission and Distribution, Vol. 140, pp. 337-342, 1993.
- [11] Mehrdad Tarfdar Hagh and Sadjad Galvani, "Minimization of load shedding by sequential use of linear programming and particle swarm optimization", Turk J Elec Eng & Comp Sci, Vol.19, No.4, 2011.
- [12] T.K.P.Medicherla, R.Billinton, and M.S.Sachdev, "Generation Rescheduling and Load Shedding to Alleviate Line Overload Analysis", IEEE Trans. Power App. Syst", vol.PAS-98, no.6, pp.1876–1884, Nov./Dec.1979.
- [13] Manoj Kumar Maharana, K. Shanti Swarup, "Transmission line overload alleviation due to contingency based on DAG assisted PSO method", International Journal of Power and Energy Conversion, 2009 Vol.1, No.4, pp.363 – 383.
- [14] Tulika Bhattacharjee and Ajoy Kumar Chakraborty, "Congestion Management in a Deregulated Power System by Rescheduling of Sensitive Generators and Load curtailment using PSO", International Journal of Emerging Technology and Advanced Engineering, ISSN 2250-2459, Volume 2, Issue 3, March 2012.
- [15] S. R. Biswal and T. Kuanr, "Congestion Management in a Deregulated Power System by Rescheduling of Sensitive Generators and Load Curtailment using PSO" International Conference on Recent Innovations in Engineering & Technology, ISBN : 978-93-83060-46-7,19-20 April 2014, GITA, BBSR.
- [16] Harish.R and Kannan.G, "Congestion Management by Generator Rescheduling using Genetic Algorithm Optimization Technique", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 3, Special Issue 4, May 2014.
- [17] N. Chidambararaj and Dr. K. Chitra, "Congestion Management Based On Active Power Rescheduling Of Generator units using Cuckoo Search Algorithm", International Journal of Scientific & Engineering Research, Volume 5, Issue 4, April-2014, ISSN 2229-5518.
- [18] K. Vijayakumar, "Multiobjective Optimization Methods for Congestion Management in Deregulated Power Systems", Hindawi Publishing Corporation ,Journal of Electrical and Computer Engineering Volume 2012, Article ID 962402, 8 pages.

Statcom Based Voltage Controller for Self Excited Induction Generator Feeding Non Linear Loads

Vishwanath Tiwari¹, Parul Shrivastava²

1.Associate Professor & HOD, Department of Electrical Engineering, School of Research & Technology, People's University, Bhopal, tiwari.vishwanath@rediffmail.com 2.Assistant Professor, Department of Electrical Engineering,SVVV,Indore,parul.electrical@gmail.com

ABSTRACT

This paper deals with the performance analysis of static compensator (STATCOM) based voltage regulator for self-excited induction generators (SEIGs) supplying non-linear loads. In practice, a number of loads are non-linear in nature and therefore they inject harmonics in the generating systems. The SEIG being a weak isolated system, its performance is very much affected by these harmonics. The additional drawbacks of SEIG are poor voltage regulation and it requires adjustable reactive power source with varying load to maintain constant terminal voltage. A three-phase insulated gate bipolar transistor (IGBT) based current controlled voltage source inverter known as STATCOM is used for harmonic elimination and it provides required reactive power for the SEIG with varying loads to maintain constant terminal voltage. A dynamic model of the SEIGSTATCOM feeding non-linear loads using stationary d-q axes reference frame is developed for predicting the behavior of the system under transient conditions. The simulated results show that SEIG terminal voltage is maintained constant even with non-linear balanced and unbalanced loads and free from harmonics using STATCOM based voltage regulator.

INTRODUCTION

This new revolution in electricity generation from wind energy has caught the attention of researchers and their interests are quite clear in numerous publications regarding wind turbines and wind farms.By the end of the 19th century the first experiments were carried out on the use of windmills for generating electricity. The international oil crisis of 1972 initiated the utilization of renewable resources on a large scale, wind power among others. Today, wind power is a fully established branch on the electricity market and it is treated accordingly. The energy gain is not the only criteria to be considered when installing new wind turbines; cost efficiency, the impact on the environment and the impact on the electric grid are some of the important issues of significant interest when making decisions about new wind turbine installations. This study aims simulation of a wind turbine driven SCIG supplying power to an isolated load. An IG can satisfy constant voltage-constant frequency (CVCF) operation, if an appropriate control is applied to the control variables. The Induction generator offers advantages hydro and wind power plants because of its easy operation, its robust construction, its natural protection against short circuit, and its low cost compared to other generators.

REPRESENTATION OF INDUCTION MACHINE IN STEADY STATE:

ISSN No.2278-8050

An equivalent circuit of induction machine, also known as the per phase equivalent model is represented in figure 1. R_1 and X_1 are the loss resistance and leakage reactance respectively of the stator, R_m and X_m are the magnetizing resistance and magnetizing reactance respectively, and R_r and X_r are the resistance and reactance of the rotor. This model is limited to the case of sinusoidal and balanced excitation. The Induction generator does not differ much in construction from the induction motor, in its operation; it resembles the transformer except that the transformer secondary is a stationary part. For this reason, it is common to use the transformer model to represent the induction generator. However, it should be observed that in spite of the fact that the magnetizing curve of both machine are similar in form, in the characteristic BxH of these machine , the slope and saturation area of the mmf curve of the induction generator, is much less accentuated than that of a good quality transformer.



Figure :1: Transformer Model of the Induction Generator

This is due to an air gap in the induction generator that reduced the coupling between primary and secondary windings. This means that the high reluctance caused by the air gap increases the magnetizing current required to obtain the same level of magnetic flux in the core, and X_m will be much smaller than it would be in a transformer.

TORQUE-SPEED CHARACTERISTIC OF THE SELF EXCITED INDUCTION GENERATOR

Neglecting the magnetizing loss resistance R_m simplified figure can be drawn as fig. 2 for convenience. From this figure, we can obtain the expressions for air gap power, converted power and converted torque, which are given as:





$$P_{airgap} = \frac{3I_{2}^{2}R_{2}}{s} = \frac{\frac{3V_{ph}^{2}R_{2}}{s}}{\left(R_{1} + R_{2}/s\right)^{2} + \left(X_{1} + X_{2}\right)^{2}}$$
(1)

$$P_{converted} = (1 - s) P_{airgap}$$
⁽²⁾

$$T_{converted} = \frac{P_{airgap}}{\omega}$$
(3)

(a) there is no torque at the synchronous speed;

- (b) both the torque –speed and power-speed curves are almost linear since from no load to full load the machine's rotor résistance is much larger than its resistance;
- (c) as resistance is predominant in this range, current and the rotor field as well as the induced torque almost linearly with the increases of the slip factor S;
- (d) the rotor torque varies as the square of the voltage across the terminals of the generator :



Figure:3 Torque – power –speed characteristic of the Induction Machine working as a brake, motor or generator

PERFORMANCE OF THE SELF- EXCITED INDUCTION GENERATOR

Performance is greatly affected by the random character of many of the variable s involved related to the availability of primary energy sources and to way consumers use the load. So the performance of induction generator depends on appropriate power plant specification at the design stage. In particular the following items:

1) Parameter of Induction Machine:-

- Operating Voltage
- Rated power
- Rated frequency used in parameter measurements
- Power factor of Machine
- Rotor speed
- Capacity for acceleration
- Isolation class
- Operating temperature

2) Load Parameter:-

- Power factor
- Starting torque and current
- Maximum Torque and current
- Generated harmonics
- Form of Connection to load :- Directly to the distribution network or through converters
- Load type:-resistive, Inductive, or capacitive, constant, passive or active or variable Self Exciting process:-
- Degree of iron saturation of the generator caused by choice of capacitor
 - Fixed or Controlled self excitation capacitor
 - Speed control
- 4) Type of primary sources :-

3)

- Solar
- Wind
- Biomass
- Or combinations.

STATCOM BASED VOLTAGE CONTROLLER FOR SELF EXCITED INDUCTION GENERATOR FEEDING THREE PHASE FOUR WIRE LOADS

The performance analysis of static compensator (STATCOM) based voltage controller for SEIG supplying three phase four wire loads. The SEIG being a weak isolated system, its performance is very much affected by harmonics. The additional drawbacks of SEIG are poor voltage regulation and it requires adjustable reactive power source with varying load to maintain constant terminal voltage. A three-phase IGBT based current controlled voltage source inverter known as STATCOM is used for harmonic elimination and it provides required reactive power for the SEIG with varying loads to maintain constant terminal voltage. A dynamic model of the SEIG STATCOM feeding non-linear loads using stationary d-q axes reference frame is developed for predicting the behavior of the system under steady state conditions.

The simulated results show that SEIG terminal voltage is maintained constant even with non-linear balanced and unbalanced loads and free from harmonics using STATCOM based voltage controller. In isolated applications, an induction machine driven by a prime mover operates as a self-excited induction generator (SEIG) with its excitation requirements being met by a capacitor bank connected across its terminals. The increased emphasis on renewable energy sources has accelerated research and development of the SEIG for autonomous power generation, due to its simplicity, ruggedness and low cost. By the invention of solid-state selfcommutating devices, it is possible to make a static, noiseless voltage regulator, which can provide continuously variable reactive power to the SEIG with varying load to keep terminal voltage constant.

The SEIG is an isolated system, which is small in size and the injected harmonics may pollute generated voltage. The STATCOM eliminates the harmonics, provides load balancing and supplies the reactive power to the load and generator. In this paper, authors are presenting a simple mathematical modeling for the Steady State Analysis of the SEIG-STATCOM system under balanced/ unbalanced three-phase and single phase non-linear loads and simulated results show that the SEIG-STATCOM system behaves an ideal supply under theses unbalanced loads. The control technique to regulate the terminal voltage of the SEE is based on the control of source currents (which have two components in-phase and quadrature with AC voltage). The inphase unit vectors (U_a, U_b, U_c) are three phase sinusoidal functions, computed by dividing the AC voltages V_a, V_b and V_c by their amplitude V_t. Another set of quadrature unit vectors (W_a, W_b and W_c) is sinusoidal function obtained from in-phase vectors (U_a, U_b and U_c). To regulate AC terminal voltage (V) it is sensed and compared with the reference voltage. The voltage error is processed in the PI controller.

SYSTEM CONFIGURATION AND CONTROL SCHEME

The schematic diagram of SEIG with excitation capacitor, STATCOM, load and control scheme is shown in Fig. 4, Excitation capacitors are selected to generate the rated voltage of SEIG at no load. The additional demand of reactive power is fulfilled using the STATCOM under varying load. The STATCOM consists of a three-phase IGBT based current controlled voltage source inverter, DC bus capacitor and AC inductors. The output of the inverter is connected through the AC filtering inductor to the SEIG terminals. The DC bus capacitor is used as an energy storage device and provides self-supporting DC bus. The output of the PI controller (I_{smq}) for AC voltage control loop decides the amplitude of reactive current to be generated by the STATCOM. Multiplication of quadrature unit vectors (W_a , W_b and W_c) with the output of PI based AC voltage controller (I_{smq}) yields the quadrature component of the source reference currents (Isaq*, Isbq* and Iscq*). To provide self supporting DC bus of STATCOM, its DC bus voltage is sensed and compared with DC reference voltage.



Figure:4: Schematic diagram of the STATCOM based controller for SEIG

The error voltage is processed in another PI controller. The output of the PI controller (I_{smd}) decides the amplitude of active current. Multiplication of in-phase unit vectors (U_a , U_b and U_c)with output of PI controller (I_{smd}) yields the in-phase component of the source reference currents (I_{sad}^* , I_{sbd}^* and I_{sad}^*). The sum of quadrature and in-phase components is the source reference currents (I_{sad}^* , I_{sbd}^* and I_{sc}^*), which are compared with the source line current (I_{sa} , I_{sb} and I_{sc}) in PWM current controller to generate switching signal for the devices Controller. Non-linear load draws non-sinusoidal currents (fundamental aswell as harmonics) due to which harmonics produced are in the generating system. Under unbalanced loading conditions, SEIG currents may be unbalanced (Produce positive and negative sequence) due to which machine is to be derated. Controller is able to filter out the harmonics and balance the unbalanced load resulting in balanced currents and voltages of the SEIG.

MODELLING OF SEIG-CONTROLLER SYSTEM

Mathematical model of SEIG-CONTROLLER system contains the modeling of SEIGand STATCOM and is as follows.

MODELLING OF CONTROL SCHEME OF CONTROLLER

Different components of SEE-CONTROLLER system are modeled as follows.

(9)

Three-phase voltages at the SEIG terminals (V_a , V_b , and V_c) are considered sinusoidal and hence their amplitude is computed as:

$$Vt = \left\{ (2/3)(V_a^2 + V_b^2 + V_c^2)^{1/2} \right\}$$
(4)

The unit vector in phase with Va, Vb, and Vc are derived as:

$$u_a = V_a / V_t, u_b = V_b / V_t, \ u_c = V_c / V_t$$
 (5)

The unit vectors in quadrature with Va, Vb and Vc, may be derived using a quadrature transformation of the in-phase unit vectors U_a , U_b and U_c [11] as:

$$w_a = -u_b / \sqrt{3} + u_c / \sqrt{3}$$
 (6)

$$w_{b} = \sqrt{3}u_{a} / 2 + (u_{b} - u_{c}) / 2\sqrt{3}$$
⁽⁷⁾

$$w_{c} = -\sqrt{3}u_{a}/2 + (u_{b} - u_{c})/2\sqrt{3}$$
(8)

QUADRATURE COMPONENT OF SOURCE REFERENCE CURRENTS

The AC voltage error Vat the nth sampling instant is:

 $V_{er}(n) = V_{tref} - V_t(n)$

Where V_{tref} is the amplitude of reference AC terminal voltage and Vt(n) is the amplitude of the sensedthree-phase AC voltage at the SEIG terminals at nth instant. The output of the PI controller for maintaining AC terminal voltage constant at the nth sampling instant is expressed as:

$$I^{*}smq(n) = I^{*}smq(n-1) + K_{pa}\{ver(n) - ver(n-1)\} + K_{ia}ver(n)$$

Where K_{pa} and K_{ia} are the proportional and integral gain constants of the proportional

IN-PHASE COMPONENT OF SOURCE REFERENCE CURRENTS

The DC bus voltage error Vdcerat nth sampling instant is:

$$V_{dcre(n)} = V_{dcref} - V_{dc(n)} \tag{10}$$

Where V_{dcref} is the reference DC voltage and $V_{dc}(n)$ is the sensed DC link voltage of the controller. The output of the PI controller for maintaining DC bus voltage of the controller at the nth sampling instant, is expressed as

$$\mathbf{I}^{*}_{smd(n)} = \mathbf{I}^{*}_{smd(n-1)} + \mathbf{K}_{pd} \left\{ V_{dc(n)-V_{dc(n-1)}} \right\} + \mathbf{K}_{id} V_{dcre(n)}$$
(11)

 $I^*_{smd(n)}$ is considered as the amplitude of active source current.

 K_{pd} and K_{id} are the proportional and integral gain constants of the DC bus PI voltage controller. Inphase components of source reference currents are estimated as:

$$\mathbf{I}^* sad = \mathbf{I}^* smd \boldsymbol{\mathcal{U}}_a \tag{12}$$

$$\mathbf{I}^* sbd = \mathbf{I}^* smd\boldsymbol{\mathcal{U}}_h \tag{13}$$

\mathbf{I}^* scd = \mathbf{I}^* smd \mathcal{U}	(14)
\mathbf{I} sca $-\mathbf{I}$ smatt _c	(17)

TOTAL SOURCE REFERENCE CURRENTS

Total source reference currents are sum of in-phase and quadrature components of the source reference currents as:

$\mathbf{I}^* sa = \mathbf{I}^* saq + \mathbf{I}^* sad$	(15)
$\mathbf{I}^*sb = \mathbf{I}^*sbq + \mathbf{I}^*sbd$	(16)
$\mathbf{I}^* sc = \mathbf{I}^* scq + \mathbf{I}^* scd$	(17)

PWM CURRENT CONTROLLER

The total reference currents $(I_{sa}^*, I_{sb}^*, I_{sc}^*)$ are compared with the sensed source currents (I_{sa}, I_{sb}, I_{sc}) The ON/OFF switching patterns of the gate drive signals to the IGBTs are generated from the PWM current controller. The current errors are computed as:

 $I_{saerr} = I^* sa - I_{sa}, I_{sberr} = I^* sb - I_{sb}, I_{scerr} = I^* sc - I_{sc}$ (18)

These current error signals are amplified and then compared with the triangular carrier wave. If the amplified current error corresponding to phase a (I_{saerr}) signal is greater than the triangular wave signal switch S₄ (lower device) is ON and switch S₁(upper device) is OFF, and the value of switching function SA is set to 0. If the amplified current error signal corresponding to I_{saerr} is less than the triangular wave signal switch S₁ is ON and switch S₄ is OFF, and the value of S_A is set to 1. Similar logic applies to other phases.

MODELLING OF THREE-PHASE NON-LINEARLOAD

The mathematical modelling of non-linear loads has beendone into following three categories.

 THREE-PHASE RECTIFIER WITH RESISTIVE LOAD: A general case of three-phase uncontrolled diode bridge rectifier with resistive load (R,) is taken as a balanced nonlinear load in which voltage across the DC load (v.) would be the maximum line voltage of SEIG (V_a, V_b, V_c,-V_a,-V_b, and -V_c) and rectifier DC load current is obtained as:

$$I_d = I_{RL} = V_s / R_{RL}$$

(19)

Rectifier AC currents are defined in Table 1 and at resistive load Id=Irl, which are considered load currents of SEIG system.

2. THREE-PHASE RECTIFIER WITH RESISTIVE - CAPACITIVE LOAD

However, practical uncontrolled diode bridge rectifier has notional value source impedance and DC capacitor is used for filtering of AC. Uncontrolled diode bridge rectifier has two operating modes i.e. conducting and non-conducting. When the diodes are in conduction, line-line voltage of ac source is connected to the load and dc side basic equation is given by:

$$V_s = (2R_{SL}I_d) / (2L_{SL})$$

(20)

In the state space derivative form, the above equation can be express as:

 $pI_d = (V_s - V_d - 2R_{SL}I_d) / (2L_{SL})$

(21)

The ac load currents in all the three phases (I_{ra} , I_{rb} and I_{rc}) of ac source are achieved by using the magnitude of Idand direction (sign) corresponding to conduction pairs of diodes.

3. SINGLE-PHASE RECTIFIER WITH RESISTIVE LOAD

A single-phase uncontrolled diode bridge rectifier with feeding resistive load is taken as non-linear load. In this case load voltage is the maximum line voltage and rectifier DC current is defined as: $I_d = I_{RL} = V_s / R_{RL}$ (22)

RESULTS AND DISCUSSION

The SEIG system with CONTROLLER feeding nonlinear balanced/unbalanced loads is simulated and results are shown in Figs. 5-7.

For the simulation, a 7.5 kW, 415V, 4-pole, 50 Hz. machines has been used as a generator and parameters of the generator are given in Appendix.

VOLTAGE BUILD-UP AND SWITCH ON THE CONTROLLER

Fig. 5 shows the steady state waveforms under voltage build up and there after switching in the controller. Response from top respectively relates to phase AC terminal voltages (V_{sabc}), Controller currents (I_{cabc}).

- 🛎 💦 🖁 และสามหน่องสามหน่านสามหน
- 🖀 🔰 🔜 The second secon

Fig.5 Voltage build-up of SEIG and switching in Controller

PERFORMANCE OF SEIG CONTROLLER SYSTEM FEEDING THREE-PHASE NON LINEAR LOAD

Fig.6 shows the Steady State waveforms of 3-phase generator voltages (V_{sabc}), three-phase controller currents (I_{cabc}), amplitude of AC terminal voltage and its reference (V_t/V_f), DC bus voltage and its reference (V_{dc}/V_{dcref}). To generated rated Voltage of 415 V (586 V Peak) at no load, 47µF capacitor per phase is connected across SEIG. At 2.5 Sec. gate pulses are given to the IGBTs and control action of current controlled voltage source inverter is activated. Controller behaves as a source of reactive power and draws active power from the generator to charge its DC bus capacitor at reference voltage (600 V). There is a small oscillation at switching in controller but damps out within a few cycles.

园 —	
19 <u>-</u>	
	งการการการการการการการการการการการการการก
ы <u>э</u> с	
ANN N	
19 19	

Fig. 6 Waveform of three phase SEIG-Controller with three phase nonlinear load

PERFORMANCE OF SEIG CONTROLLER SYSTEM WITH RESISTIVE LOAD





The simulated waveforms of SEIG Voltages, Controller currents, amplitude of AC terminal voltage and its reference (V_t/V_f), DC bus voltage and its reference (V_{dc}/V_{dcref}), Generator rotor speed are illustrated in Fig. 7 for Three-phase SEIG-Controller system.

CONCLUSIONS

This paper has focus on Detail analysis of Constant Voltage and Constant frequency operation of a Self Excited Induction Generator using Power Balance Theory, which gives constant voltage also maintain constant frequency. We use a STATCOM base Voltage Controller which provides the constant voltage and constant frequency feed with different type of loads.

The simulation result obtained on a MATLAB/Simulink, which shows that STATCOM based Voltage Controller provide better voltage profile. The parameter of 7.5 KW Induction Machine which works as an Induction Generator feed to the Matlab/Simulink model in order to verify the performance.

REFERENCES

- [1] D.Bassett, E. M. POTTER, "Capacitive Excitation for Induction Generators" Elect. Eng., vol. 54, pp. 540-545, May 1935.
- [2] C. E. WAGNER, "Self Excitation of Induction Motors" Trans. AIEE, vol. 58, pp. 47-51, Feb. 1939.
- [3] S.M. ERM, "Modelling and Analysis of a Wind Turbine Driven Self-Excited Induction Generator", Ph.D. Thesis, METU, 1982.
- [4] Y. W.LIAO, E.LEVI, "Modelling and simulation of a stand-alone induction generator with rotor flux oriented control" Electric Power Syst. Vol. 46 pp.141-152, 1998.
- [5] S.M. ERM & H.B. ERTAN, et al., "Various Induction Generator Schemes for wind-Electricity generation" Electric Power Syst. Res. 23 pp. 71-83, 1992.
- [6] R. LEIDHOLD, G. GARCIA& M. I.VALLA, "Field Oriented Controlled Induction Generator with Loss Minimization" IEEE Tran. Ind. Electron, vol.49, pp. 147-156, Feb. 2002.
- [7] M. Y.ÜÇTUG, "Modelling, Analysis and Control of a Wind Turbine Driven Self-excited Induction Generator", Ph.D. Thesis, METU, 1986.

Electrical Liberation Machining – A State-Run

Manish gangil¹, Arvind Kumar Chauhan², M.K Pradhan³

¹ Assistant Professor School of Research and Technology, Bhopal, India
 ² Assistant Professor School of Research and Technology, Bhopal, India
 ³ Assistant Professor MANIT, Bhopal, India

Abstract

With the advent of newer materials and intricate shapes of components, unconventional methods of material removal have been developed. Electrical Discharge Machining (EDM) is one of such processes of material removal. This paper briefly describes the basic features of EDM, such as, its mechanism of material removal, advantages, disadvantages and application possibilities.

EDM is now more economical non convectional machining process. It is used widely used on small scale as well major industries. EDM process is affect by so many process parameter which are electrical and non electrical. The machining parameters selected as a variables are discharge current, pulse on- time, pulse off-time, dielectric level and flushing pressure. The output measurement includes surface roughness.

Keywords: Electrical Discharge Machining.

Introduction

Electrical Discharge Machining (EDM) is an electro- thermal non-traditional machining process, where electrical energy is used to generate electrical spark and material removal mainly occurs due to thermal energy of the spark. EDM is mainly used to machine difficult-to-machine materials and high strength temperature resistant alloys. EDM can be used to machine difficult geometries in small batches or even on job-shop basis. Work material to be machined by EDM has to be electrically conductive.

The operating regime and usage environment of machinery components in modern manufacturing industries are becoming more hostile. The demand for advanced materials with high strength, high toughness and high hardness is now urgent. Therefore, the new species of advanced materials have been invented for diverse industrial applications. These advanced materials ordinarily have excellent mechanical properties to satisfy the requirements of applications that are commonly used in harsh environments.

Machining newly developed materials with excellent mechanical properties faces critical problems. Conventional processes for machining advanced materials encounter several obstacles, so the conventional processes, such as cutting and forming, are becoming unsatisfactory as they are associated with poor machining efficiency, precision and quality in current industrial applications. Hence, non-conventional processes. such as waterjetMachining, laser beam machining, electron-beam machining and electrical-discharge machining (EDM), provide attractive alternatives for difficult-to-machine materials. Numerous researchers have thus performed intensive works on the non-conventional processes, so the machining performance associated with non-conventional processes has been markedly improved, when the technique is intended for modern manufacturing [1].

2.1 Principle of EDM

In this process the metal is removing from the work piece due to erosion case by rapidly recurring spark discharge taking place between the tool and work piece. Show the mechanical set up and electrical set up and electrical circuit for electro discharge machining. A thin gap about 0.025mm is maintained between the tool and work piece by a servo system shown in Figure 2.1. Both tool and work piece are submerged in a dielectric fluid. Kerosene/EDM oil/deionized water is very common type of liquid dielectric although gaseous dielectrics are also used in certain cases.

This Figure 1 is shown the electric setup of the Electric discharge machining. The tool is mead cathode and work piece is anode. When the voltage across the gap becomes sufficiently high it discharges through the gap in the form of the spark in interval of from 10 of micro seconds. And positive ions and electrons are accelerated, producing a discharge channel that becomes conductive. It is just at this point when the spark jumps causing collisions between ions and electrons and creating a channel of plasma.

A sudden drop of the electric resistance of the previous channel allows that current density reaches very high values producing an increase of ionization and the creation of a powerful magnetic field. The moment spark occurs sufficiently pressure developed between work and tool as a result of which a very high temperature is reached and at such high pressure and temperature that some metal is melted and eroded. Such localized extreme rise in temperature leads to material removal. Material removal occurs due to instant vaporization of the material as well as due to melting [1-2].



Figure 1 Set up of Electric Discharge Machining

The molten metal is not removed completely but only partially as the potential difference is withdrawn as shown in Figure 2, the plasma channel is no longer sustained. As the plasma channel collapse, it generates pressure or shock waves, which evacuates the molten material forming a crater of removed material around the site of the spark.



Figure 2 Working Principle of EDM Process

2.2 Advantages of EDM

(a) Any material that is electrically conductive can be cut using the EDM process.

(b) Hardened work pieces can be machined eliminating the deformation caused by heat treatment.

(c) X, Y, and Z axes movements allow for the programming of complex profiles using simple electrode. (d) Complex dies sections and molds can be produced accurately, faster, and at lower costs. Due to the modern NC control systems on die sinking machines, even more complicated work pieces can be machined.

(e) The high degree of automation and the use of tool and work piece changers allow the machines to work unattended for overnight or during the weekends

(f) Forces are produced by the EDM-process and that, as already mentioned, flushing and hydraulic forces may become large for some work piece geometry. The large cutting forces of the mechanical materials removal processes, however, remain absent.

(g) Thin fragile sections such as webs or fins can be easily machined without deforming the part.

2.3 Limitation of EDM

(a) The need for electrical conductivity – To be able to create discharges, the work piece has to be electrically conductive. Isolators, like plastics, glass and most ceramics, cannot be machined by EDM, although some exception like for example diamond is known. Machining of partial conductors like Si semi-conductors, partially conductive ceramics and even glass is also possible.

(b) Predictability of the gap - The dimensions of the gap are not always easily predictable, especially with intricate

work piece geometry. In these cases, the flushing conditions and the contamination state of differ from the specified one. In the case of die-sinking EDM, the tool wear also contributes to a deviation of the desired work piece geometry and it could reduce the achievable accuracy. Intermediate measuring of the work piece or some preliminary tests can often solve the problems.

(c) Low material removal rate- The material removal of the EDM-process is rather low, especially in the case of die- sinking EDM where the total volume of a cavity has to be removed by melting and evaporating the metal. With wire- EDM only the outline of the desired work piece shape has to be machined. Due to the low material removal rate, EDM is principally limited to the production of small series although some specific mass production applications are known.

(d) Optimization of the electrical parameters - The choice of the electrical parameters of the EDM-process depends largely on the material combination of electrode and work piece and EDM manufactures only supply these parameters for a limited amount of material combinations. When machining special alloys, the user has to develop his own technology [3-4].

2.4 Important Parameters of EDM

(a) **Spark On-time (pulse time or Ton):** The duration of time (μ s) the current is allowed to flow per cycle. Material removal is directly proportional to the amount of energy applied during this on-time. This energy is really controlled by the peak current and the length of the on-time.

(b) **Spark Off-time (pause time or Toff):** The duration of time (μs) between the sparks (that is to say, on-time). This time allows the molten material to solidify and to be wash out of the arc gap. This parameter is to affect the speed and the stability of the cut. Thus, if the off-time is too

short, it will cause sparks to be unstable.

(c) **Arc gap (or gap):** The Arc gap is distance between the electrode and work piece during the process of EDM. It may be called as spark gap. Spark gap can be maintained by servo system (fig 2.2).

(d) **Discharge current (current lp):** Current is measured in amp Allowed to per cycle. Discharge current is directly proportional to the Material removal rate(e) **Duty cycle (τ):** It is a percentage of the on-time relative to the total cycle time. This parameter is calculated by dividing the on-time by the total cycle time (on-time pulse off time).

(f) **Voltage (V):** It is a potential that can be measure by volt it is also effect to the material removal rate and allowed to per cycle. Voltage is given by in this experiment is 50 V.

(g) **Diameter of electrode (D):** It is the electrode of Cu- tube there are two different size of diameter 4mm and 6mm in this experiment. This tool is used not only as a electrode but also for internal flushing.

(h) **Over cut** – It is a clearance per side between the electrode and the workpiece after the marching operation.

(i) **Dielectric level** - Dielectric level is measured in mm.

2.4 Application of EDM

1. The EDM process is most widely used by the mould- making tool and die industries, but is becoming a common method of making prototype and production parts, especially in the aerospace, automobile and electronics industries in which production quantities are relatively low.

2. It is used to machine extremely hard materials that are difficult to machine like alloys, tool steels, tungsten carbides etc.

3. It is used for forging, extrusion, wire drawing, thread cutting.

4. It is used for drilling of curved holes.

5. It is used for internal thread cutting and helical gear cutting.

6. It is used for machining sharp edges and corners that cannot be machined effectively by other machining processes.

7. Higher Tolerance limits can be obtained in EDM machining. Hence areas that require higher surface accuracy use the EDM machining process.

8. Ceramic materials that are difficult to machine can be machined by the EDM machining process.
 9. Electric Discharge Machining has also made its presence felt in the new fields such as sports, medical and surgical, instruments, optical, including automotive R&D areas.

10. It is a promising technique to meet increasing demands for smaller components usually highly complicated, multi- functional parts used in the field of micro-electronics.

3. Literature Survey

Jagadish et al [5] have defined the experimental study multi response parameter optimization problems of green manufacturing. A combination of gray relational analysis (GRA) associated with principal component analysis (PCA) method has been developed and has optimized the process parameters of green electrical discharge machining (EDM). The major performance characteristics selected are process time, relative tool wear ratio, process energy, concentration of aerosol, and dielectric consumption. The corresponding machining parameters

are peak current, pulse duration, dielectric level, and flushing pressure. Initially, Taguchi (L9) orthogonal array has been used to perform the experimental runs and the optimal process parameters using the GRA approach. The weighting values corresponding to various performance characteristics are determined using PCA. Thereafter, analysis of variance (ANOVA) is applied to determine the relative significant parameter and percentage of contribution of machining parameters; the peak current is the most influencing parameter having 52.87 % of contribution followed by flushing pressure, dielectric level, and pulse duration with

22.00, 21.52, and 3.55 %, respectively. Finally, multiple regression analysis is performed to determine the relationship between machining parameters and performance characteristics. The Fuzzy-TOPSIS and VIKOR methodologies have been used to compare the results of the proposed methodology, and the optimum process parameters obtained are peak current (4.5 A), pulse duration (261 µs), dielectric level (80 mm), and flushing pressure (0.3 kg/cm2).



Graph No. 01 Comparison Chart of Proposed Results

Jagadish et al [6] have defined the experimental study integrated approach of Entropy– Technique for Order Preference by Simulation of Ideal Solution (TOPSIS) method for the determination of the optimal process parameters in green electrical discharge machining. In this work, initially, an experiment is performed using Taguchi experimental technique. Thereafter, Entropy-TOPSIS is

used to convert multi response parameters into single response parameter. Finally, the ranking of the parameter decides the best experimental set up and optimized the input process parameters. In this research, the weight of the quality characteristics of each of the output parameters are determined by the entropy method which influences the closeness coefficient values for finding the optimal experimental set up using TOPSIS method. On the basis of optimization results it has been found that peak current (4.5 A), pulse duration (261 _s), dielectric level (80 mm) and flushing pressure (0.3 kg/cm2), which are the best combinations of this analysis.

Optimization parameters for EDM drilling were also developed to summarize the effect of machining characteristic such as MRR, TWR and SR. The effects of the machining parameters (MRR, TWR and SR) in EDM on the machining characteristics of SKH 57 high-speed steel were investigated by Yan-Cherng et.al [7]. Experimental design was used to reduce the total number of experiments. Parts of the experiment were conducted with the L18 orthogonal array based on the Taguchi method. Moreover, the signal-to-noise ratios associated with the observed values in the experiments were determined by ANOVA and F -test. The relationship of MRR and SR with pulse duration graph in different peak current is as shown in Graph 2.3. During the experiment MRR increases with peak current MRR initially increased to a peak at around 100 μ s, and then fell.

Lee and X.P.Li [8] showed the effect of the machining parameter in EDM of tungsten carbide on the machining charatercteristics. The EDM process with tungsten carbide better machining performances is obtaining generally with the electrode as the cathode and the workpiece is anode. Tool with negative polarity give the higher material removal rate, lower tool wear and better surface finish. High open circuit voltage is necessary for tungsten carbide due to its high malting point and high hardness value and cupper tungsten as the tool electrode material with tool electrode material with negative polarity. This study confirms that there exists an optimum condition for precision machining of tungsten carbide although the condition may vary with the composing of martial, the accuracy of the machine and other other external factor.

Wang and Lin [10] discuss the optimization of W/Cu composite martial are used the Taguchi method. W/Cu composites are a type of cooling material highly resistant to heat corrosion produced through powder metallurgy. The Taguchi method and L18 orthogonal array to obtain the polarity, peak current, pulse duration, duty factor, rotary electrode rotational speed, and gapload voltage in order to explore the material removal rate, electrode wear rate, and surface roughness. The influenced of each variable and optimal processing parameter will be obtained through ANOVA analysis through experimentation to improve the process.

Sohani et al. [11] discussed about sink EDM process effect of tool shape and size factor are to be considering in process by using RSM process parameters like discharge current, pulse ontime, pulse off-time, and tool area. The RSM-based mathematical models of MRR and TWR have been developed using the data obtained through central composite design. The analysis of variance was applied to verify the lack of fit and adequacy of the developed models. The investigations revealed that the best tool shape for higher MRR and lower TWR is circular, followed by triangular, rectangular, and square cross sections. From the parametric analysis, it is also observed that the interaction effect of discharge current and pulse on-time is highly significant on MRR and TWR, whereas the main factors such as pulse off-time and tool area are statistically significant on MRR and TWR.

Balasubramanian et al [12] has work two different materials have been used as work pieces. These EN8 and D3 steel materials have been machined in an Electrical discharge machine which has wide application in Industry fields. The important process parameters that have been selected are peak current, pulse on time, die electric pressure and tool diameter. The outputs responses are material removal rate (MRR), tool wear rate (TWR) and surface roughness (SR). The Cast Copper and Sintered Powder Metallurgy Copper (P/M Copper) have been considered as tool electrodes to machine the fore said work pieces. Response surface methodology (RSM) has been used to analyze the parameters and analysis of variance (ANOVA) has been applied to identify the significant process parameters. The influences of interaction of parameters have also been studied. Scanned electron microscope (SEM) images have been taken after machining on the work pieces for both electrodes to study the structure property correlation. The input parameters were optimized in order to obtain maximum MRR, minimum TWR and minimum SR.

4. Conclusion

A variety of materials can be cut by EDM process. EDM is a safer and more effective tool for quality cutting. This paper is use to comparative study of EDM with other traditional and non traditional machining processes. In this paper advantages and disadvantage of EDM meson.

After a comprehensive study of the existing literature, gap has been observed in EDM. Literature review reveals that the researchers have carried out most of work on EDM. However,

relatively few researcher studied the effect of discharge current, pulse on-time, pulse off-time, dielectric level and flushing pressure; all together on surface roughness for machining AISI H13 tool steel.

References

[1] K.H. Ho and S.T. Newman, "A State of the art electrical discharge machining (EDM)" International Journal of Machine Tools & Manufacture 43 (2003) 1287–1300

[2] Anand Pandey and Shankar Singh *"review on Current research trends in variants of Electrical Discharge Machining"* International Journal of Engineering Science and Technology Vol. 2(6), 2010, 2172-2191

[3] M. Kunieda, B. Lauwers, K. P. Rajurkar, B. M. Schumacher4 "Advancing EDM through Fundamental Insight into the Process"

[4] Michael F. W. Festing -Guidelines for the Design and

Statistical Analysis of Experiments" ATLA, 2001

[5] Jagadish, Ray A., 2014, Optimization of process parameters of green electrical discharge machining using principal component analysis (PCA), Int J Adv Manuf Technol, 1-13

[6] Jagadish, Ray A., 2014, Optimization of Green Electrical Discharge Machining Using an Integrated Approach, Proceedings of the 2014 IEEE IEEM

[7] Lin, y., Cheng, C., Su, B and Hwang, L, 2006. Machining characteristics and optimization of machining parameters of SKH 57 high-speed steel using electrical-discharge machining based on Taguchi method. Materials and Manufacturing Processes, 21(8), 922-929.

[8] Lee, S.H. and Li, X.P., 2001. Study of the effect of machining parameters on the machining characteristics in electrical discharge machining of tungsten carbide. Journal of Materials Processing Technology, 115(3), 344-358.
 [9] Tarun Modi, Shaileshbhai sanawada, Jignesh Patel, 2015,

A review paper on Optimization of process parameter of EDM for air hardening tool steel, Tarun Modi et al Int. Journal of Engineering Research and Applications, Vol. 5, Issue 1(Part 1), January 2015, pp.32-37.

[10] Wang, C.-. And Lin, Y.C., 2009. Feasibility study of electrical discharge machining for W/Cu composite. International Journal of Refractory Metals and Hard Materials, 27(5), 872-882.

[11] Sohani, M.S., Gaitonde, V.N., Siddeswarappa, B. And Deshpande, A.S., 2009. Investigations into the effect of tool shapes with size factor consideration in sink electrical discharge machining (EDM) process. International Journal of Advanced Manufacturing Technology,1-15.

[12] Balasubramanian, P., Senthilvelan, T., 2014. Optimization of Machining Parameters in EDM process using Cast and Sintered Copper Electrodes. 3rd International Conference on Materials Processing and Characterisation (ICMPC 2014),

1292 – 130.

Experimental comparative study of Mechanical power and Mechanical efficiency of horizontal axis two and three blade micro wind turbine

Rajendra Prasad Jarele¹, Amit Agrawal², S.K. Agrawal³

1 Research Scholar SRCEM Banmore Gwalior (M.P.) 2 Assistant Professor SRCEM Banmore Gwalior (M.P.) 3 Assistant Professor SRCEM Banmore Gwalior (M.P.)

ABSTRACT

In the current socio economic condition of the world power production and its method of production has become the centre of all concerned society and research industry. Producing power without pollution has become the necessity of the present power and research industry. Wind turbine has an edge over all the power producing methods but it has a dis- advantage of not being operational at low wind speed. In this research work a 60 cm blade micro wind turbine has been developed and tested for its better utility for domestic power production and for lighting purpose in remote area with low wind speed areas. A NACA – 5516 aero foil section was chosen for the development of the rotor blade of the wind turbine. Two set of rotor turbine was developed one with two blade and another with three blade and tested for the various performance aspects i.e. T S R, cut in speed, efficiency, electrical efficiency and rated power to select a better rotor for domestic wind turbine.

During the test it was found that the three blade rotor blade is more sensitive to air and its cut in Air speed 1.7 m/s whereas the cut in speed for the two blade system was found to be 2.5 m/s.

INTRODUCTION

Today in 21st century, energy has become an essential part of modern life. The conventional fossil fuel sources are depleting at very high rate and cannot fulfil energy requirement for a very long time. Also fossil fuel based energy sources are costly and pollutes the environment. To overcome these problems a number of work had been done in the field of renewable energy sources and a lot of works are in progress. The renewable energy sources which have been given more importance are solar energy, wind energy and hydro energy. These are the cheapest and cleanest sources of energy.

The wind energy has become a main energy source in field of renewable energy sources. In

- 2014, 22% of renewable energy was produced by wind farming. In this work, a research on optimization of small wind turbine is to be done for domestic energy generation. Particularly
- in rural India the domestic turbine or Micro wind turbine can play an important role as it is cheaper

PROBLEM FORMULATION

Though the power production through wind turbine is very economical in the area where wind speed is more than 5 m/s. But in the low wind speed areas the domestic wind turbine may be used to produce small scale electricity to fulfil the personal requirement. The main problem in these areas to operate is to get rated power at lower wind speed. In the present work it is proposed to develop two micro wind turbine one with two blade and other with multi blade. The three blade turbine would generate more torque than two blade turbine and it will rotate at lower wind speed too can be used to produce power at lower wind speed.

EXPERIMENTAL SETUP

Different parts were prepared and collected for the preparation of final proposed wind turbine model. After collecting all these parts, these were assembled to prepare final model. After assembling all of the parts mentioned above the proposed model looks like.



List of Components

The main components used in this wind turbine are as follows:

S.	Name of Components	S. No	Name of Components
No			
1	DC Motor	8	Anemometer
2	Dc Led Bulb	9	Tachometer
3	Blade	10	Multimeter
4	Shaft		
5	Ball Bearing		
6	Hub		
7	Stand		

OBSERVATION

The model was assembled and positioned nose to wind. RPM of rotor was noticed and registered. Here a number of comparative observations of two blade wind turbine and thee blade wind turbine were taken for different wind speed.

Place of experiment	Maharajpur airfield
Date of experiment	10/05/2016
Tower height	25 meter



Experiments were carried at 25 meter tower height at five different wind speed, observation obtained from experiments are attached in annexure 1:

Mathematical Calculation

Let.

 $v_{i=}$ incident air speed $v_e = exit air speed$ A= rotor swept area M = mass of the air striking per sec $= \rho. A. v_i$ ρ = density of air K E of the air $=\frac{1}{2}$ M v_i^2 $= \frac{1}{2} \rho. A. v_i. v_i^2 \\= \frac{1}{2} \rho. A. v_i^3$ Theoretical power = $\frac{1}{2}\rho AV^3$ Maximum Theoretical Power Developed By a Wind Turbine: Theoretical maximum power = $0.59 \frac{1}{2} \rho A V_i^3$ Actual power calculation: Actual power extracted by the rotor $=\frac{1}{2}\rho A v_a (v_i^2 - v_e^2)$ Where, $\begin{aligned} v_a &= (v_i + v_e)/2\\ \text{Mechanical efficiency} &= \frac{Actual \ power}{Theoretical \ power}\\ &= \left[\frac{1}{2} \ \rho.A. \ v_a. \ (v_i^2 \ - v_e^2)\right] / \left[\frac{1}{2} \ \rho.A. \ v_i^3\right] \end{aligned}$

RESULTS

On conducting several observation certain data was obtained, on conducting mathematical calculation Some results were obtained, these are listed below in annexure 2.

Variation of exit velocity with wind speed for both wind turbine

Here it is clear that at same wind speed wind turbine with two blade shows more exit velocity than that of three blade. Here exit velocity is shown with y-axis while wind speed with x-axis.



Variation of RPM with wind speed for both wind turbine

Here it is clear that at same wind speed, wind turbine with three blade shows more RPM than that of with two blade. So it is clear that wind turbine with three blade is more sensitive.



Variation of Efficiency with wind speed for both wind turbine

Here it is clear that at same wind speed, wind turbine with three blade shows more efficiency than that of with two blade. So it is clear that wind turbine with three blade is more efficient.



CONCLUSION

The detailed experimental study RPM, Mechanical Efficiency and mechanical power for both wind turbine has been carried out. Start up speed of both wind turbine also examined. The conclusion obtained is as follows:

- 1. Wind turbine with three blade gives more RPM than that of with two blade at same wind speed.
- 2. Wind turbine with three blade is more efficient.
- 3. Start up speed of two blade wind turbine is 2.5 m/sec while it is 1.7 m/sec for three blade system, hence three blade system is more sensitive.

4. Three blade system gives more mechanical efficiency and has more mechanical power.

FUTURE SCOPE

The present experimental work has shown many interesting results regarding blade number and design in aspects of blade sensitiveness and efficiency. On the basis of present results some recommendation for future work can be given.

- 1. Number of blade can be increased for more investigation.
- 2. A battery based energy storage system can be applied.
- **3.** As it is light weight, compact, small and cheap, an arrangement can be done for household lighting purpose.

REFERENCES

- [1]. Https://en.wikipedia.org/wiki/Wind_power, cited on jan 2016.
- [2]. Https://en.wikipedia.org/wiki/File:Global_Wind_Power_Cumulative_Capacity.svg, cited on jan2016.
- [3]. https://en.wikipedia.org/wiki/Wind_turbine, cited on jan 2016
- [4]. https://en.wikipedia.org/wiki/Aerofoil, cited on fab 2016
- [5]. www.aerofoildatabase.com,cited on fab 2016.
- [6]. Rai, G.D., 2005, "A text book of Non-conventional energy sources" ISBN No. 81-7409-073-8, pp. 227-310.
- [7]. https://en.wikipedia.org/wiki/Wind_turbine_design cited on fab2016
- [8]. Shemmeri, T. Al, "An EBook on wind turbine" on bookboon.com cited on March 2016.
- [9]. Http://www.aerofoiltools.com cited on February 2016.
- [10]. Roshan, R. and Agrawal, M.K., 2015 "Analysis of Blade Design, Power Output and Efficiency of A Horizontal Axis Wind Turbine on A Working Model", International Journal of Emerging Technology and Advanced Engineering ISSN 2250-2459, Volume 4 (12).
- [11]. Kale, Sandeep K. and Verma, R.N., 2014, "Aerodynamic Design of a Horizontal Axis Micro wind Turbine Blade Using NACA 4412 profile", International Journal of Renewable Energy Research, Vol. 4(1).
- [12]. Rathod, Vicky k. and kamdi, S.Y., 2014, "Design of PVC Bladed Horizontal Axis Wind Turbine for Low Wind Speed Region" Int. Journal of Engineering Research and Applications www.ijera.com ISSN: 2248-9622, Vol. 4 (7), pp.139-14
- [13]. Monteiro, J. M. M., Pascoa, J. C. and Borjo, F. M R. P., 2009, "Simulation of the Aerodynamic Behaviour of a Micro Wind Turbine" European Association for the Development of Renewable Energies, Environment and Power Quality international Conference on Renewable Energies and Power Quality (ICREPQ'09).
- [14]. Kishore, R.A., 2013, "A Small-scale Wind Energy Portable Turbine (SWEPT)" Master Thesis, Virginia Polytechnic Institute (UK).
- [15]. Sanchez, C.V., 2013, "Blade performance Analysis and design improvement of a Small Wind turbine," Diploma thesis at Purdue University, West Lafayette. ISSN 0974-3154 Volume 6, (1), pp. 105-113.
- [16]. Deshmukh, N. R. and Deshmukh, S.J., 2013, "Development of a modified Wind Turbine", International journal Mechanical Engineering and Robotic Research, ISSN 2278-018, Vol. 2 (6).
- [17]. Tiwari, Kshitij and Harinarayana Tirumalachetty, 2014, "Increasing the Efficiency of Grid Tied Micro Wind Turbines in Low Wind Speed Regimes" Smart Grid and Renewable Energy, 5, 249-257.

Experimental Investigation of using Ethenol and Gasoline Blends in Single Cylinder 4 Stroke SI Engine

Anand Modi¹, C.S. Koli², S.K. Agrawal³

1Research Scholar SRCEM Banmore Gwalior (M.P.), 2Assistant Professor SRCEM Banmore Gwalior (M.P.) 3Assistant Professor SRCEM Banmore Gwalior (M.P.)

1. ABSTRACT

A LARGE PART OF TRANSPORTATION, MOVEMENT ETC DEPENDS ON SI ENGINES. EVEN AGRICULTURE TODAY IS LARGELY DEPENDENT ON SI ENGINES. HOWEVER IN RECENT PAST WE HAVE WITNESSED A RAPID INCREASE IN PETROL PRICES. THIS PRICE RISE HAS NOT ONLY AFFECTED COMMUTERS BUT ALSO FARMERS AND INDUSTRIES. IN THE FUTURE OF AUTOMOBILE BASED ON INTERNAL COMBUSTION ENGINES HAS BEEN BADLY AFFECTED BY TWO MAJOR PROBLEMS. THAT IS LESS AVAILABILITY OF FUEL AND ENVIRONMENTAL DEGRADATION. SO IT IS VERY IMPORTANT TO FOUND SOME NEW RENEWABLE NON POLLUTING ALTERNATIVE FUELS TO ENSURE THE PROPER AND SAFE SURVIVAL OF INTERNAL COMBUSTION ENGINES. IN THIS PAPER THE INVESTIGATION MAIN PURPOSE IS TO EVALUATE THE PERFORMANCE OF THE ENGINE AND DECREASE FUEL CONSUMPTION BY USING ALTERNATIVE FUEL ON COMBUSTION IN FOUR STROKE SI ENGINE. THE PRESENT RESEARCH WORK IS AN ATTEMPT TO INCREASE TO ENVIRONMENTAL PROTECTION AND REDUCE DEPENDENCY ON PETROLEUM. ETHANOL IS ADDITIVE HAVE BATTER ANTIKNOCK CHARACTERISTIC AND REDUCE THE CO, HC EMISSION SO REDUCE THE EXHAUST GAS TEMPERATURE. IN PRESENT STUDY WE EVALUATE THE PERFORMANCE OF FOUR STROKE SINGLE CYLINDER SPARK IGNITION ENGINE WITH RATIO 5%, 10%, 15%, 20%, 25%, 30%, 35%, 40% ETHANOL AND GASOLINE BY VOLUME. THE PERFORMANCE PARAMETER OF THE FOUR STROKE SI ENGINE ARE DETERMINE AT VARIOUS LOAD AND LOW COMPRESSION RATIO (2.5), ON DIFFERENT BLENDS OF ETHANOL-GASOLINE.

Key word: Ethanol, alternate fuel, gasoline, Performance

INTRODUCTION

Ethanol, an alcohol, is most often made from corn but can also be made from other biomass resources. Although ethanol has been in use since the mid-1800s, use and production has varied greatly over the years. Recently there has been a resurgence of interest in ethanol-based transportation fuels. This study focuses on explanations for the revival, and on issues associated with ethanol development. The revival is due, in part, to the need for alternative agricultural markets due to all time low crop prices, mandates requiring fuel additives and alternative fuel vehicles purchases, and recent gasoline price hikes. The strength and persistence of ethanol development is contingent on successfully addressing a number of challenges. Challenges include increasing ethanol use in current markets and expanding its use in new markets; increasing production relative to cost; developing the use of feedstock other than corn, and

optimizing the environmental benefits of ethanol in comparison to the use of petroleum products. Ethanol is alternative fuels and many research works are carried out on the development of these fuels.

The oil embargo against the U.S. by Arab countries in1973 created petroleum shortages, resulting in significant price increases for gasoline and creating long lines at gasoline stations. The gasoline shortage accelerated concern about U.S. dependency on imported petroleum products, and created an impetus for energy conservation and the development of alternative fuels. The 1978 Energy Tax Act was passed in response to this crisis. This Act exempted ethanol-blended fuel (with at least 10% ethanol) from the 44 /gallon Federal excise tax imposed on motor fuels. The Act also provided a 10% investment tax credit for ethanol production facilities. In 1980, three additional ethanol related Act's were passed. The Energy Security Act was created to provide the ethanol industry over \$1 billion in loan guarantees. The incentives for increased ethanol production were created to utilize excess supplies of corn caused by the halting of grain exports (including corn) to the Soviet Union. The U.S. had ceased exports in response to the invasion of Afghanistan by the Soviets.

The 1990 Clean Air Act amendments mandated the use of RFG in areas with severe ozone pollution and Oxy fuels during winter months, and in areas with high carbon monoxide pollution. Alcohols, such as ethanol, were designated as the fuels to be used in reformulated and oxygenated gasoline. The 1992 Energy Policy Act mandated the purchase of alternative fuel vehicles in government and private fleets and established a goal of 30% replacement of petroleum fuels by 2010. This Act also expanded the E-10 excise tax exemption to include ethanol blends under 10%. In 1998, through the Transportation Efficiency Act, the 5.44 federal ethanol tax exemption was extended to 2007.⁴¹ This same year, Ford manufactured approximately 90,000 E-85 compatible Ranger pickup trucks and a second public E-85 refueling station was established in Michigan in downtown Lansing.

The aim of the present study is to evaluation of performance test of different blends of ethanol with gasoline in a SI engine. The following are the major objectives to fulfil the aim of present study. Ethanol has higher octane number, flammability limit, oxygen ratio and is considered to be renewable fuel. Ethanol has high heat of vaporization which improves brake thermal efficiency, brake power and reduce specific fuel consumption for particular percentage of ethanol gasoline blends. One of the objectives is to investigate the performance of SI engine using different percentages of ethanol-gasoline blends as fuel on the different percentage of ethanol- gasoline blending which are E0, E5, E10, E15, E20, E25, E30, E35, and E40. By using ethanol fuel it reduces the air pollution problem up to some extent and also prevents fossil fuel reserves from depletion. Most of the emissions from the engines are harmful for environment as well as human health. Only four most important emissions considered under this study are CO, unburned hydrocarbon (HC), NOx and CO2. It has been found that exhaust gas temperature reduce for particular percentage of blending of ethanol with gasoline. Ethanol is an oxygen enriched chemical agent; containing 35% oxygen by weight. Here we use different ratio of ethanol and gasoline blends in the four stroke SI engine. Ethanol has higher octane number; hence addition of ethanol in the gasoline increases the octane number of the blends. Higher octane number reduces the knocking problem in the engine.

A. TEST FUEL

Experiment has been conducted ethanol-gasoline bland such as E0 (pure gasoline), E5(combination of gasoline 95% by volume, ethanol 5% by volume), E10(combination of gasoline

90% by volume, ethanol 10% by volume), E15(combination of gasoline 85% by volume, ethanol 15% by volume), E20(combination of gasoline 80% by volume, ethanol 20% by volume), E25(combination of gasoline 75% by volume, ethanol 25% by volume), E30(combination of gasoline 70% by volume, ethanol 30% by volume), E35(combination of gasoline 65% by volume, ethanol 35% by volume) and E40(combination of gasoline 60% by volume, ethanol 40% by volume), is used in the study.

Sr. No.	Character	Ethanol	Petrol
1	Molecular weight	46.07	100-105 avg.
2	Composition by mass	w(C)=52% w(H)=13% w(O)=35%	w(C)=85% w(H)=15%
3	Sp. Gravity	0.794	0.7-0.78
4	Density Kg/m3	790	700-780
5	Boiling Temp.([°] C)	78	27-255
6	Freezing Point([°] C)	-114	-57
7	Ignition Temp ($^{\circ}$ C)	423	390-420
8	Theoretical air fuel ratio (Kg/Kg of air)	9	14.7
9	Octane number	100	80-99
10	Cetane number	8	0-10

Table: 1 The physical and chemical property of ethanol and petrol

B. LITERARUTE REVIEW

Tiwari [1] studied experimental determination of suitable ethanol- gasoline blend rate at high compression ratio for gasoline engine. In this study, ethanol and gasoline blends ware used as fuel to improve performance in SI engine. It was determined from the experimental results that the brake thermal efficiency is increasing for a particular percentage of blending of alcohol. And the percentage is different for different alcohols. After a particular fixed percentage of blending the performance of SI engine decreases. Sarkar at al. [2] investigated the performance and emission characteristics of SI engine running on different ethanol gasoline blends. The purpose of this study is to experimentally analyse the performance and the pollutant emissions of a four-stroke SI engine operating on ethanol gasoline blends. The performance characteristics are improved but only to some extent with the use of ethanol or blends of ethanol and gasoline. The power, torque increases at a certain percentages of ethanol in the blends and BSFC increases with the increment of the percentage of ethanol in the blend. Yadav [7] investigated the influence of compression ratio and ethanol-gasoline blending on the performance, emission of four stroke single cylinder SI (spark ignition) engine. Pandya at al. [8] study investigates the effect of using unleaded gasoline and alcohol as additives blends on spark ignition engine (SI engine) performance. Two strokes, single cylinder SI engine were used for conducting this study. Kumar

at al [9] work gasoline is taken as reference which is blended with ethanol. Physical properties relevant to the fuel were determined for the four blends of gasoline and ethanol. A four cylinder, four stroke, varying rpm, Petrol engine connected to eddy current type dynamometer was run on blends containing 5%,10%,15%,20% ethanol and performance characteristics were evaluated. In this paper it is shown that the higher blends can replace gasoline in a SI engine, results showed that there is a reduction in exhaust gases and increase in Mechanical efficiency, Specific Fuel Consumption and air fuel ratio on blending.

PREPOSED WORK

Under the environmental consideration, using ethanol gasoline blend is better than use of pure gasoline because of the renewability and less toxicity of ethanol. Several studies on the performance and emission characteristics of spark ignition engines, fuelled with pure gasoline and blended with ethanol, have been performed and are reported in the literature. The study reveals the understanding of the engine performance characteristics and emissions production under ethanol gasoline blending ratio. In this experiment, we evaluate the performance of four stroke single cylinder spark ignition engine at low compression ratio (2.5) at the blend of 5%, 10%, 15%, 20%, 25%, 30%, 35% and 40% of ethanol and gasoline by volume. Performance parameters (brake thermal efficiency, weight of fuel consumed brake power and specific fuel consumption) were determined at various loads and compression ratio 2.5 on engine with ethanol blended gasoline. The comparison was made on performance of conventional SI engine with pure gasoline operation. Pure ethanol and high level blends may need some engine modifications. One of the purposes of the experiments is to investigate the performance of SI engine using different percentages of ethanol-gasoline blends as fuel.

Ethanol blend	Calorific Value (MJ/kg)
Petrol	45
E5	44.25
E10	43.5
E15	42.75
E20	42
E25	41.25
E30	40.5
E35	39.75
E40	39
Ethanol blend	Calorific Value (MJ/kg)
Petrol	45
E5	44.25

Table 2: Calorific values of ethanol and gasoline blends

EQUIPMENTS

A. ENGINE- As shown in fig. 1 The engine is a "four stroke single cylinder variable compression ratio petrol engine coupled with eddy current dynamometer". It is a vertical cylinder and air cooled spark ignition engine.



Fig. 1 Experimental set-up

Sr. no.	Items	Specifications
1	Engine Make	GREAVES
2	Engine Sr. No.	G0H 6898076 SPT
3	Engine Variety	Vertical, Single Cylinder
4	Number Of Stroke	Four
5	Rated RPM	3000RPM
6	Compression Ratio	2.5:1 to10:1
7	Stroke	66.7mm
8	Bore	70mm
9	Specific Fuel Capacity	475 g/kwhr
10	Fuel Tank Capacity	5 litre
11	Starting	Hand starting
12	Lubricating Oil	SAE 20W40
13	Cooling System	Air cooling
14	Rated Power Output	2.5Kw

Table 3: Engine Specifications

B. AIR INTAKE MEASUREMENT

The suction side of engine cylinder is connected to an air tank. The atmospheric air is drawn into the engine cylinder through the air tank. A manometer is provided to measure the pressure drop across an orifice provided in the intake pipe of the air tank. This pressure drop across the orifice is used to calculate the volume of air drawn into the cylinder. (orifice dia 20mm).

C. FUEL MEASUREMENT

The fuel is supplied directly to the engine from the fuel tank through a way manifold and a burette.

D. COOLING SYSTEM

Air Cooled Engine.

E. EXHAUST SYSTEM

The exhaust gas is passed through a calorimeter .The exhaust gas temperature at the inlet and outlet of calorimeter and watercooling temperature at the inlet and outlet of calorimeter are indicated by respective thermocouples and indicated in the digital temperature indicators.

METHEDOLOGY

Measurement methodology includes the way and approach of taking observation during the experiment. In any experimental work there should be a proper methodology of experiment for getting proper data and results. So getting proper results the way of taking observation should be very accurate and systematically. In the particular experiment setup of four stroke SI engine measurement methodology is proceed in this way.

A. Testing and inspection of experiment setup

After settling all the instruments, observation is about to start but before starting any experiment on the setup it is very necessary to inspect all the places where care should be taken to avoid any danger during the observation process. The step of inspection of experiment setup is completed by checking all the important places of experiment setup in a regular time interval during whole process of taking observation. The way of inspection is described here.

a- Tightening all nuts on foundation structure coupled with engine frame.

b- Checking the level of oil in the tank to maintain proper level of oil on burette.

c- Checking the level of cooling water in water jacket.

d- Checking the leak points of oil in various gate valves where pipes are connected

e- Insure all switches kept off in electrical load panel before starting the engine.

f- Check and control speed of engine by adjusting the fuel supply before taking the observation.



Fig. 2 making ethanol gasoline blend

B. Precautions

- 1. Do not run engine without lubrication oil (SAE 20W40 Type).
- 2. Use only petrol as fuel.
- 3. Keep the trainer on rigid surface & well-ventilated room. Keep the trainer at least 1 meter away from the nearest wall to allow sufficient air circulation.
- 4. Run the engine at no load for around 5 minutes. Do not remove the load suddenly. Load and unload the Engine gradually by adding weights to the weight hanger.
- 5. Before ending the experiment, bring the engine to the no load condition and then stop the engine after running for 2-3 minutes.

- 6. If you are not using the trainer for long time take following.
- 7. Drain the fuel tank, burette and all fuel pipes.
- 8. There must be sufficient oil in the oil box.
- 9. The rope should be wrapped around the brake drum properly such that it does not slip.
- 10. Ensure zero reading on weighting balance in no load condition. If not adjust it by screw provided on weighting balance.
- 11. Do not start the engine without cooling water supply to the engine and calorimeter.

C. Measurement & Key thermodynamic parameter

Fuel consumption: Experiment starts from first step of measurement of fuel consumption by filling the fuel in the burette. As the fuel is filled in the burette time is started in the stop watch from 0 to 15 ml fuel consumed in the burette. In this way fuel consumption in terms of ml/sec in noted from no load to maximum load. Same process is repeated for number of observations taken at different load condition.

Measurement of speed: Measurement of speed using a shaft encoder with analogue or digital display is in principle quite simple.

Specific fuel consumption and efficiency:

In engine tests, the fuel consumption is measured as a flow-mass flow per unit time. A more useful parameter is the specific fuel consumption (SPF) the flue flow rate per unit power output. Specific fuel consumption is defined as the fuel consumed for one kilowatt power generation in one hour. Specific fuel consumption is decreases when load is increases. Fuel consumption is increases with load but brake specific fuel consumption decreases because it is function of fuel consumption and brake power. It measures how efficiency an engine is using the fuel supplied to produce work.

D. Experimental Procedure

- 1. Fill the fuel tank with the fuel.
- 2. Start the cooling water supply to the engine and the calorimeter.
- 3. Fill the burette with the fuel.
- 4. Switch on the control panel.
- 5. Start the engine with cranking handle provided.
- 6. Note down the readings in the observation table.
- 7. Load the engine gradually by providing weights on the loading hanger.
- 8. Note down the reading, for various load.

				B.P.					
Load	B.P. at	B.P.	B.P. at	at	B.P. at	B.P. at	B.P. at	B.P. at	B.P. at
in kg	E0	at E5	E10	E15	E20	E25	E30	E35	E40
0.8	0.258	0.259	0.262	0.255	0.253	0.250	0.246	0.243	0.233
1.8	0.574	0.577	0.583	0.569	0.562	0.555	0.547	0.540	0.513
2.8	0.880	0.884	0.895	0.874	0.865	0.852	0.839	0.829	0.755
4.8	1.453	1.463	1.484	1.444	1.426	1.406	1.381	1.361	1.274
5.8	1.682	1.701	1.725	1.667	1.644	1.636	1.532	1.505	1.379

RESULT AND DISCUSSION

Table 4: Break Power in KW at different blend of ethanol with gasoline



Figure 3: Variation of break power with spring load for different blend of ethanol-gasoline **Figure 3**, Depicts the effect of variation of load on brake power for different blends. From the curve it is observed that the value of the break power is increased as the load increases. It is observed the BP is increasing from E0 to E10, after that as blending ratio increases, decrease in the brake power. The maximum BP achieved at E10 and minimum BP found out at E40.

			Temp.						
Load(Kg)	Temp.	Temp.	at						
	at E0	at E5	E10	E15	E20	E25	E30	E35	E40
0.8	97	93	87	99	101	102	103	104	107
1.8	104	99	93	105	112	115	117	121	124
2.8	115	104	101	113	118	121	125	129	132
4.8	119	117	112	121	123	126	128	131	137
5.8	128	124	119	129	132	135	139	142	145

Table 5: Exhaust gas temperature at outlet of the calorimeter & Different loads of different blending ratio of ethanolgasoline.



Figure 4: Variation of exhaust gas temperature with load for different blend of ethanol-gasoline
Figure 4, Depicts the effect of effect of variation of load on exhaust gas temperature for different blends. It is observed that the Exhaust gas temperature decreases from E0 to E10, after that as blending ratio increases, increase in the exhaust gas temperature.

CONCLUSION

By conducting the experiment on 4 stroke single cylinder SI engine in I.C Engine Lab of SRCEM Banmore, following Conclusions have been drawn:-

- Brake Power increases from blending E0 to E10, further increase in blend ratio, the BP decreases. The maximum BP achieved at E10.
- The exhaust gas temperature decreases from E0 to E10, further increase in blend ratio, increases the exhaust gas temperature. This concluded that the four stroke SI engine at E10 gives less exhaust gas temperature in the environment as compared to pure petrol. Various properties of petrol and ethanol like density, ignition temperature are similar. Also the two liquids can be mixed easily without any external agent. Ethanol helps in clean and complete combustion as it provides oxygen during combustion. Ethanol blends help with higher octane rating and lower exhaust emissions.

From the results, it can be concluded that ethanol blends are quite successful in replacing pure gasoline in four stroke spark ignition engine. Results clearly show that brake power is increasing for a particular percentage of blending of alcohol. After a particular fixed percentage of blending the performance of SI engine decreases. The blending of ethanol in gasoline provides good combustion property. If we add alcohols after a particular percentage than it is incapable in proper combustion of fuel which results in lowering thermal efficiency. Performance of E10 shows better result within group of various blends of ethanol with gasoline. E10 ethanol blended Gasoline is the best choice for use in the existing Spark Ignition Engines without any modification to increase Efficiency.

Various properties of petrol and ethanol like density, ignition temperature are similar. Also the two liquids can be mixed easily without any external agent. Ethanol helps in clean and complete combustion as it provides oxygen during combustion. Ethanol blends help with higher octane rating and lower exhaust emissions.

REFERNCES

- [1] Gaurav tiwari Int. "Experimental investigation of ethanol blends with gasoline on SI engine" Journal of Engineering Research and Applications ISSN : 2248-9622, Vol. 4, Issue 10(Part - 5), October 2014, pp.108-114.
- [2] Achinta Sarkar, Achin Kumar Chowdhuri, Arup Jyoti Bhowal and Bijan Kumar Mandal "The Performance and Emission Characteristics of SI Engine Running on Different Ethanol Gasoline Blends" Issue 6, June-2012 ISSN 2229-5518International Journal of Scientific & Engineering Research, Volume 3.
- [3] Virendra Singh Yadav "Performance Evaluation of SI (Spark Ignition) Engine using Ethanol Gasoline Blend at Various Compression Ratio" International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 Vol. 4 Issue 10, October-2015.
- [4] Viral K Pandya, Shailesh N Chaudhary, Bakul T Patel, Parth D Patel "Experimental study on the effect of methanol gasoline, ethanol-gasoline and butanol-gasoline blends on the performance of 2- stroke petrol engine" International Journal of Advances in Engineering & Technology, Nov 2011.
- [5] Jitendra kumar, Dhananjay trivedi, Prakash Mahara, Ravi Butola "Performance Study of Ethanol Blended Gasoline Fuel in Spark Ignition Engine" IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)e-ISSN: 2278-1684,p-ISSN: 2320-334X, Volume 7, Issue 3 (Jul. - Aug. 2013), PP 71-78.
- [6] Linoj Kumar, N.P.Ram Mohan, "Bio Fuels : The Key to India's sustainable energy need", The Energy and Resources Institute (TERI) (Teri Energy Data Directory of Year book) 2003/04 TERI PRESS NEW DELHI.
- [7] Alvydas Pikunas, Saugirdas Pukalskas & Juozas Grabys" influence of composition of gasoline ethanol blends on parameters of internal combustion engines" Journal of KONES Internal Combustion Engines vol .10, 3-4 (2003).

- [8] Alvydas Pikunas, Saugirdas Pukalskas & Juozas Grabys" influence of composition of gasoline ethanol blends on parameters of internal combustion engines" Journal of KONES Internal Combustion Engines vol .10, 3-4 (2003).
- [9] M. Gautam, D.W. Martin II, "Combustion characteristics of higher alcohol/gasoline blends", Proceedings of the Institution Of Mechanical Engineers, Part A: Journal Of Power and Energy 2000 214:497.
- [10] Yao Li-Hong, Gao Yan, Li Wen-Bin, Wu Jiang, "Effects of the mixture fuel of ethanol and gasoline on twostroke engine", 2010 International Conference On Intelligence Computation Technology and Automation.
- [11] A. Abuhabaya, J.D. Fieldhouse, "Variation of engine performance and emissions using ethanol blends", Paper No: 1789-36th MATADOR Conference.

Mechanism of oxidative thermal degradation of the mixture of HDPE, LDPE and Jute fiber at early temperature

Vijesh Verma¹, Savita Dixit², Gajendra Dixit³

1Department of Chemistry, M.A.N.I.T., Bhopal, 462051, vijeshverma@yahoo.in 2Department of Chemistry, M.A.N.I.T., Bhopal, 462051, savitadixit1@yahoo.com 3Department of Mechanical Engineering, M.A.N.I.T., Bhopal, 462051, dixitgajendra1@gmail.com

ABSTRACT

WPB and JFWPB were thermally degraded in the oxidative medium in a self-designed, laboratory scale, stainless steel reactor, up to the final temperature of 180°C by keeping the heating rate of 1°C/min. It was reported that obtained liquid yield by JFWPB improved up to 56% than WPB. The comparatively FTIR analysis evident that randomly generated unsaturated hydrocarbon fragments were transformed in to the oxygenated products which were identified as phytol, free fatty acids and silica derivatives by using the GC/MS analysis.

Keywords: Mechanism, oxidative thermal degradation, waste polyethylene, jute fiber

1. INTRODUCTION

Waste to energy (WTE) technology is a promising way to transform the municipal solid waste (MSW) into the energy resource. According to Plastic Europe Market Research Group, the reported global production of plastic is 322 million tons in the year 2015 [1] in which only United States individually contributes 250 million tons of municipal solid waste (MSW) [2] which generates numerous environmental problems. Pyrolysis is a thermal degradation process of organic materials which operated at very high temperature in oxygen less environment. On pyrolysis of plastic by mixing biomass causes the improved in liquid product yield than the plastics pyrolyzed individually [8]. Co-pyrolysis of plastic waste with different biomass such as karanja & niger seeds [3], red oak [4], rice husk [5], almond shell [6], oil shell [7], pine cone [8], wood biomass [9], forestry biomass wastes [10], lignocellulosic materials [11] has been studied widely. Jute fibers take out from the bark of the Jute plant (*Corchorus olitorius*). This research work explains the mechanism of the thermal degradation of the mixture of HDPE, LDPE and Jute fiber in the oxidative environment at early temperature.

EXPERIMENTAL

1.1. Materials

Waste, useless, broken HDPE (High density polyethylene) buckets and waste LDPE (Low density polyethylene) shopping carry bags were collected from domestic sources. These waste polyethylene samples were characterized by CIPET (Central Institute of Plastics Engineering and Technology) Bhopal India. The Jute fiber was purchased from the local area market.

1.2. Method

The blend of Jute, HDPE, LDPE in 1:3:1 by wt% which designated as JFWPB and the blend of HDPE and LDPE in of 3:1, by wt% designated as WPB, were thermally degraded up to the final temperature of 180°C with a heating rate of 1°C/min., in the presence of oxygen as per per

scheme shown in figure A, in a self-designed, stainless steel, laboratory scale reactor shown in figure B.





2. RESULTS AND DISCUSSION

As per FTIR_{WPB} (Fig. C), the characteristic transmittance bands appear at 3072.60 cm⁻¹ corresponds to =CH₂ stretch, the sharp band at 1649.14cm⁻¹ corresponds to -C=C- stretch, a weak band at 1375.25 cm⁻¹ corresponds to CH₂ bend, the two small bands at 1359.82 cm⁻¹ and 1328.95 cm⁻¹ corresponds to $-CH=CH_2$ (in plane) and CH₃ bend respectively. The transmittance band at 972.12 cm⁻¹ and 887.26 cm⁻¹ corresponds to the $-CH=CH_2$ (out of plane). The presence of these distinguishing sharp bands indicating that Oil_{WPB} consisted of numerous unsaturated hydrocarbon fragments which produced by the thermal breakdown of polyethylene. In the FTIR_{JFWPB} (Fig. C), the transmittance band at 3612.67 cm⁻¹ corresponds to the primary alcohol (R-OH), band at 3348.42 cm⁻¹ corresponds to either N-H containing amine or amide. The sharp, single, small band at 2185.35 cm⁻¹ corresponds to the nitrile (-C≡N). The band at 1730.15 cm⁻¹ corresponds to the carbonyl group (C=O) indicating the presence of an aldehyde or else ketone or else carboxylic acid or else ester or else amide or else anhydride or else acyl halide. Two close bands at 908.47 cm⁻¹ and 887.26 cm⁻¹ corresponds to the mono substituted aromatic compounds.



Figure C: Comparative FTIR of Oil_{WPB} and Oil_{JFWPB}

The common transmittance bands with reduced intensities were also reported. In FTIRWPB the band at 3072.60 cm⁻¹ with intensity 43.86 corresponds to $=CH_2$ bond, in FTIRJFWPB the location of this band was moved at 3074.53 cm⁻¹ with reduced intensity of 14.39. The band at 1649.14 cm⁻¹ with intensity 42.69 corresponds to C=C, shifted to 1643.35 cm⁻¹ and the band intensity reduced to 14.58, The bands at 1375.25 cm⁻¹, 1359.82 cm⁻¹, 1328.95 cm⁻¹ with the band intensities 18.91,

36.12, 53.91 corresponds to CH₂, -CH=CH₂ (in plane), CH₃ respectively were shifted at 1444.68 cm⁻¹, 1435.04 cm⁻¹, 1415.75 cm⁻¹ with the reduced intensities of 11.55, 12.62, 16.21. The persistence of these specific bands with the reduced intensity and appearance of some new characteristic bands clearly indicates that these bands were transformed from unsaturated hydrocarbons to the alcohols, carbonyls, amines, nitriles, and aromatic compounds in oxidative atmosphere of the reactor. As per the structure the polyethylene was a high molecular weight polymeric material which consisted of several repeated monomer units of ethylene (-H₂C=CH₂-) and by the thermal treatment, the low molecular weight hydrocarbon fragments such as =C-H, C=C, =CH₂, were produced randomly and recovered as the mixture of hydrocarbon as oily substance. When WPB heated up to 180_{\circ} C inside the oxidative atmosphere of reactor there were negligible degradation takes place because polyethylene effectively degraded between 400 - 500_{\circ} C [3-11] and b scissoring of polymeric chains not initiated [12], which results into the negligible degradation of polyethylene and the reported liquid yield was also negligible i.e. < 5%.



Figure D: Mechanism of Oxidative thermal degradation

After that, when JFWPB was thermally degraded, the jute in the reaction mixture was degraded at 100° C (Fig. E).



Figure E: TG and DTG curves of jute fiber, HDPE and LDPE respectively.

In the oxidative atmosphere of the reactor the chief components of Jute like water molecules (H_2O) , cellulose $([C_6H_{10}O_5] n)$, hemicellulose (a complex molecule), lignin $([C_9H_{10}O_2, C_{10}H_{12}O_3, C_{11}H_{14}O_4])$, amino acids $(R-CH(NH_2)-COOH)$ etc. were decomposed randomly which consequences into the generation of free radicals (A^{\bullet}) , intermediate species $([A^+B^-])$, electrophiles (A^{δ_+}) , nucleophiles (A^{δ_-}) and the rector get fulfilled with these highly energetic reactive species and these reactive species randomly attacks on the polymeric chains of HDPE and LDPE into the mixture and causes the random scissoring of these polymeric chains effectively which results, the early decomposition of polyethylene and generation of unsaturated hydrocarbon fragments at a comparatively low temperature $(180^{\circ}C)$. To achieve the saturation and stability, these generated

reactive chemical species from biomass and polyethylene starts reacting randomly with each other's and unsaturated hydrocarbon fragments (Alkenes) quickly converted into the alcohols (R-OH), primary amines (R-NH₂), carbonyls (RCOOR), and nitriles (RCN) etc., and these instant synthesized chemical compounds were collected as an improved liquid product yield (Fig. D).

4. CONCLUSION

When WPB and JFWPB thermally degraded in oxidative environment, a clear synergistic effect at comparatively low temperature was reported and the liquid yield from JFWPB was improved up to 56% than WPB. The synthesis of oxygenated compounds from the unsaturated hydrocarbons were reported by using FTIR and GC/MS which were identified as phytol, free fatty acids and silica containing compounds.

REFERENCES

[1] PlasticsEurope (PEMRG) / Consultic

[2] Staley, B.F., Barlaz, M.A., "Composition of municipal solid waste in the United States and implications for carbon sequestration and methane yield. J Environ Eng., 2009, pp.901–9.

[3] Shadangi, K.P., Mohanty, K., "Co-pyrolysis of Karanja and Niger seeds with waste polystyrene to produce liquid fuel. Fuel, 2015, pp.492-498

[4] Xue, Y., Zhou, S., Brown, R.C., Kelkar, A., Bai, X., "Fast pyrolysis of biomass and waste plastic in a fluidized bed reactor. Fuel, 2015, pp.156, 40-46

[5] Costa, P., Pinto, F., Miranda, M., André, R., Rodrigues, M., "Study of the experimental conditions of the co-pyrolysis of rice husk and plastic wastes. Chem Eng., 2014, pp.1639-1644

- [6] Önal, E., Uzun, B.B., Pütün, A.E., "Bio-oil production via co-pyrolysis of almond shell as biomass and high density polyethylene. Energy Convers Manage., 2013, pp.704–10
- [7] Aboulkas, A., Makayssi, T., Bilali, L., harfi, K.El., Nadifiyine, M., Benchanaa, M., "Co-pyrolysis of oil shale and High density polyethylene: Structural characterization of the oil. Fuel Processing Technology, 2012, pp.203-208
- [8] Brebu, M., Ucar, S., Vasile, C., Yanik, J., "Co-pyrolysis of pine cone with synthetic polymers. Fuel, 2010, pp.1911–8
- [9] Sharypov, V.I., Marin, I., Beregovtsova, N.G., Baryshnikov, S.V., Kuznetsov, B.N., Cebolla, V.L., "Copyrolysis of wood biomass and synthetic polymer mixtures. Part I: influence of experimental conditions
- on the evolution of solids, liquids and gases. J Anal Appl Pyrol., 2002, pp.15–28
- [10] Paradela, F., Pinto, F., Ramos, A.M., Gulyurtlu, I., Cabrita, I., "Study of the slow batch pyrolysis of mixtures of plastics, tyres and forestry biomass wastes. J Anal Appl Pyrol., 2009, pp.392–8
- [11] Jakab, E., Blazsó, M., Faix, O., "Thermal decomposition of mixtures of vinyl polymers and lignocellulosic materials. J Anal Appl Pyrol., 2001, pp.49–62

[12] Ates, F., Miskolczi, N., Borsodi, N., "Comparison of real waste (MSW and MPW) pyrolysis in batch reactor over different catalysts.Part I: product yields, gas and pyrolysis oil properties. Bioresource Technol., 2013, pp.443–54

Recent Developments in Simulation Techniques for Vapour-Compression Refrigeration Systems

Arvind Kumar Chauhan¹ Manish gangil² M.K Pradhan³

¹ Assistant Professor School of Research and Technology, Bhopal,
 ² Assistant Professor School of Research and Technology, Bhopal,
 ³ Assistant Professor MANIT, Bhopal

Abstract

Simulation has been widely used for performance prediction and optimum design of refrigeration systems. A brief review on history of simulation for vapour-compression refrigeration systems is done. The models for evaporator, condenser, compressor, capillary tube and envelop structure are summarized. Some developing simulation techniques, including implicit regression and explicit calculation method for refrigerant thermodynamic properties, model-based intelligent simulation methodology and graph-theory based simulation method, are presented. Prospective methods for future simulation of refrigeration systems, such as noise-field simulation, simulation with knowledge engineering methodology and calculation methods for nano fluid properties are introduced briefly. **Keywords:** Refrigeration; Compression system; Survey; Process; Modeling; Simulation.

1. Introduction

The output of refrigeration systems has been increasing rapidly in recent decades and refrigeration systems become more important for people's daily lives. For example, room air conditioners used in China increased by about 15% per year in the past 10 years, and nowadays the use of air conditioners consumes a lot of electricity, amounting up to 40% of the total electricity consumption in the summer in some cities likes Shanghai. Therefore, it is important to make the design process of refrigeration systems more efficient and the product performance better. Computer simulation is one of the valuable means to accomplish this target.

The following conventional method is still used for designing refrigeration systems: to determine the required performance object of a product at first, then to estimate the working conditions, and to calculate the structural parameters at last. This process is very straightforward and quite easy to be understood. However, the actual performance of the product might obviously deviate from the required one because there is no accurate model used in the design process.

The computer simulation method has been used for designing refrigeration systems and has shown its advantages over the conventional one. The process of modifying the parameters and simulating with modified parameters will be repeated for many times until a set of the most suitable parameters is obtained. Such a computation process can be implemented by adding some optimization subprograms or directly operated by users based on their experiences, and can be used for optimum design of refrigeration systems.

The requirements for simulation at least include: (1) stability, (2) rapidness and (3) accuracy. These three requirements may conflict with each other, and then a com- promise has to be made. A lot of techniques to improve the stability, rapidness and accuracy have been presented, but the effects are still not good enough in many cases and more researches are necessary.

The present paper will summarize the state of the art of the simulation techniques for vapour-

compressor motor is used, the time step size must be very small, which will result in very slow simulation [20]. Therefore, a dynamic model reflecting the dynamic characteristics of all parts of the compressor might be more accurate than a steady state model but too complicated for simulation of refrigeration systems.

2.2. Capillary tube model

Experimental and theoretical studies on capillary tube began in the 1940s [20], and a lot of models and algorithms have been developed to meet different requirements.

2.2.1. Adiabatic and non-adiabatic capillary tube models

Models for adiabatic capillary tubes [26e28] are simpler than those for non-adiabatic ones, and they have been studied for longer time. These models can be used to describe the refrigerant flow in insulated capillary tubes as well as in capillary tubes having low heat exchange with their surroundings. A capillary tube directly exposed to the ambient air, as used in room air conditioners, can be described by the adiabatic capillary tube model because the airside heat transfer area and the natural convection heat transfer coefficient are small and the speed of the refrigerant flow through the capillary tube is high.

2.2.2. Homogeneous-flow and separated-flow distributed parameter models

Most of models for adiabatic and non-adiabatic capillary tubes are distributed parameter models which can be further divided into homogeneous-flow distributed parameter model and separated-flow distributed parameter models.

The separated-flow model has fewer assumptions and can reflect the metastable flow of refrigerant through the capillary tube [12]. The metastable flow described in the separated-flow model has influence on the refrigerant mass-flow rate prediction. Due to the effect of the metastable flow, the refrigerant mass-flow rate in capillary is affected not only by the working conditions, but also by the way reaching this condition.

3. Developing simulation techniques

There are some developing techniques to improve the accuracy and speed of simulation, or to extend simulation functions.

3.1. Reversible fast calculation method for refrigerant thermodynamic properties

The purpose of developing the reversible fast calculation method for refrigerant thermodynamic properties is to accelerate the simulation speed and to improve the simulation stability.

3.1.1. Requirements on calculation method for refrigerant thermodynamic properties in system simulation Refrigeration system simulation has the following requirements on the calculation of refrigerant thermodynamic properties:

(1) Fast calculation. Since there are numerous calculations of refrigerant thermodynamic properties in the simulation, the calculation speed of refrigerant thermodynamic properties is a vital factor for practical simulation, and it influences the component model selection in the entire system simulation. If the calculation of refrigerant thermodynamic properties is complicated, the models for the components have to be simplified in order to guarantee the calculation speed of the entire system simulation, which will decrease the function and accuracy of the system simulation.

(2) High stability. Since there exist numerous times of calls for the calculation of refrigerant thermodynamic properties, calculation divergence is likely to happen even if divergence probability is low in a

single calculation, and the requirement on the stability has to

be extremely strict.

(3) Reversibility. In the simulation of refrigeration and air conditioning systems, many refrigerant thermodynamic properties need to be converted to each other. Even a very little deviation in a single conversion process will lead to a large difference in the final calculated results because of a large number of iterations required.

(4) Continuity and smooth. Only an iteration of continuous functions can provide a convergence result. As some differential coefficients are used for some kinds of refrigerant thermodynamic properties, the differential coefficients of those thermodynamic properties should be continuous too, i.e. the function curve of the refrigerant thermodynamic properties should be smooth.

The EOS (equation of state) method is usually used to predict refrigerant thermodynamic properties in a wide range with a high accuracy. But the calculation speed and stability are limited by unavoidable iterations in calculation and so the EOS method is not suitable for simulation of refrigeration systems.

3.1.2. Some methods to speed up the calculation speed of refrigerant thermodynamic properties The look-up table method is an easy way to improve the calculation speed of refrigerant thermodynamic properties. A table that contains the values of different refrigerant thermodynamic properties should be established in advance for this method. These values are mostly calculated with EOS. The simulation programs will look-up this table during the simulation process. If the state point is not included in this table, its property value will be calculated from those at its neighboring state points in the table with a linear interpolation method.

The explicit polynomial regression method is another simple yet fast calculation method for refrigerant thermodynamic properties. The stability of this method is also better than EOS while the accuracy is still satisfied [59]. But this method cannot guarantee the calculation reversibility. So divergence might happen in simulation unless extremely high regressing accuracy is applied. 3.1.3. Implicit regression and explicit calculation method

The implicit regression and explicit calculation method can ensure the calculation speed, stability and reversibility of refrigerant thermodynamic properties [62]. With this method, an implicit polynomial equation is got by regression, and analytical solutions of this equation are used as the correlations for calculating refrigerant thermodynamic properties. Two analytical solutions from the same equation are certainly reversible. The highest power in this equation is not larger than four in order that the equation can be solved analytically. An implicit polynomial equation for regression can be got from an explicit polynomial equation by converting the dependent variable of the explicit polynomial equation into an independent variable. As the implicit polynomial equation contains one more independent variable than the explicit equation, it can contain more lower-order terms and so has better accuracy.

The implicit regression and explicit calculation method is suitable for both pure refrigerants and refrigerant mixtures. The deviations from the original property values for regression can be ignored while the calculation speed can be increased by three orders of magnitude.

3.2. Model-based intelligent simulation methodology to improve the simulation accuracy and flexibility

Artificial intelligence techniques, such as ANN (artificial neural network), fuzzy theory and expert system, belong to non-model method. They do not need mathematical models but have high adaptability. The artificial intelligence technique was used to predict the performance of refrigeration and air conditioning appliances. But some unsolvable problems in using such a method may occur because of the imperfection of the artificial intelligence technique itself and the

limitation of the user's understanding.

When the modern artificial intelligence techniques are combined with mathematical models of refrigeration systems, called as model-based

intelligent simulation [2], the simulation software has certain "intelligence" for simulating the actual complex objectives and becomes more practical.

For the heat exchanger model, ANN can be used to make up the deviations between the original model prediction and experimental data [67]. Distributed parameter models are usually used for highly accurate simulation of heat exchangers. But the simulation of a distributed parameter model is slow. In order to raise the simulation speed with good accuracy, a simplified model can be used firstly, and then an ANN

is used to make up the difference between the simplified model and the distributed parameter model.

For the compressor model, a simple mathematical model containing two empirical parameters of volumetric efficiency and motor efficiency can be combined with an intelligent module. When we use the model for performance prediction, the configuration data and the rotation speed of the compressor are used as inputs of the theoretical model to calculate the theoretical flow rate, and then the predicting program is used to calculate the volumetric efficiency according to the inputs shown in Fig.



indicating the important performance of the system, such as input power to compressor, condensing pressure, evaporating pressure, condensing heat, cooling capacity, the refrigerant pressure drop in the evaporator. The simulation result of the characteristic parameters can be improved by adjusting the empirical parameters in the refrigeration system model, such as the compressor volumetric efficiency, motor efficiency, heat transfer coefficients and friction coefficient.

4. Promising simulation techniques in the future

There are still some simulation techniques which are not well used in the refrigeration field now but are believed by the present author to have a good prospect in the future.

4.1. Noise-field simulation

Noise is an ever present by-product of most refrigeration appliances and may become a critical problem when the appliances are used in bedrooms. People always like quiet in sleeping, and noise might be the most important factor for a customer to choose a room air conditioner for his/her bed- room. So the noise generated by refrigeration systems and their components has become a concern of the designer.Efforts with simulation or other methods to decrease the noise of refrigeration

systems and their components have been made [74e78]. As a fan is an obvious noise source, simulation of the aerodynamic noise of fans is necessary [79]. However, the air duct system of a refrigeration system may contain more components than a single fan. For example, the air duct system of an air conditioner outdoor unit consists of a fan, a heat exchanger, a deflecting ring, an air outlet louver, an electric motor supporter, etc. It is better to simulate the entire air duct system in order to get a better aerodynamic noise decrease for the entire refrigeration system. With the help of simulation, the influence of the components of the air duct system on the noise can be analyzed and then these components may be optimized to decrease the noise of the refrigeration system.

For example, the noise generated by the outdoor unit of a split air conditioner with different outlet louvers can be predicted in order to optimize the outlet louver. Fig. 7 shows the simulated 1/3 octave sound spectrums for the circular air outlet louver and the square air outlet louver. It can be noted that the sound pressure levels

are reduced when the circular air outlet louver is used instead of the square air outlet louver, and the reduction is especially obvious when the frequencies is in between 800 and 2500 Hz. Therefore, the circular air outlet louver is preferred [78].4.3. Calculation methods for nanofluid properties

Nanofluid is a new type of heat transfer fluid by suspending nanoparticles in a conventional liquid, and it can have much higher thermal conductivity than a conventional heat transfer fluid [83]. Nanoparticles can be added to coolant, lubricant or refrigerant in a refrigeration or air conditioning system [84], and nanofluid might be used more widely in the future.

As a basis of simulating a refrigeration system with nano- fluid, the calculation method for nanofluid properties is required. The thermal conductivity, as a basic property of a nanofluid, has been simulated with different methods. Wang et al. [85] believed that the traditional thermal conductivity algorithms of solid-liquid phase fluids, such as the Maxwell model and the Bruggeman model, were imprecise for nanofluids, and they presented a modified Maxwell model based on the fractal theory. Xuan et al. [86] presented another modified Maxwell model by considering the Brownian motion. Keblinski et al. [87] believed that the key factors of heat transfer enhancement of nanofluids were nanoparticles' dimensional effect, fraction of nanoparticles and particles aggregation. Ding et al. [88] presented a simulation method, which can reflect the influence of nanoparticles' dimensional effect, ratio of nanoparticles and particles' aggregation. With Ding's method, the space structure of a nanoparticle cluster should be simulated firstly, the thermal conductivity of a nanoparticle cluster is done secondly, the influence of the adsorption layer on the thermal conductivity of a nanoparticle cluster is calculated thirdly, and the thermal conductivity of the nanofluid can be predicted finally. Fig. 8 shows the simulated space structure of a nanoparticle cluster which is similar to that of the electron microscopy photo. Many kinds of nanofluid properties, such as electric conductivity and viscosity, have not been studied yet. Calculation methods for these properties are needed in simulation of a refrigeration system with nanofluid, and should be presented in the future.

5. Concluding remarks

Simulation has become a useful method in design of vapour compression refrigeration systems. A practical simulation method must be stable, rapid and accurate. The requirements on stability,

rapidness and accuracy may conflict with each other, and then a compromise has to be made according to the specific simulation objective. For different simulation purpose, the suitable model and algorithm may be different. For the simulation of a refrigeration system consisting of several components, the component models should be simpler than that for the simulation of a single component. The dynamic model of compressor for simulation of refrigeration systems can be divided into two parts: the steady state part for the mass-flow rate calculation and the dynamic part for the calculation of heat exchange process. The approximate analytic model for capillary tubes, and the zone and long-term dynamic model for heat exchangers are recommended for dynamic simulation of refrigeration systems.

An envelope structure can be considered as a linear system because the property variation can be ignored in the actual range of refrigeration conditions. It is not the best method to formulate the heat transfer differential equations and solve them together with the equations for other components during the entire simulation process. It is recommended to calculate the transfer behavior of the envelop structure at first, and then to synthesize them with the disturbance variables to calculate the system dynamic response in the simulation of refrigeration systems. As there is only one time to solve the differential equations of the envelop structure, the calculation speed can be enhanced by several orders of magnitude.

The EOS method is an accurate method to calculate refrigerant thermodynamic properties. But it is not suitable for simulation of refrigeration systems because of its low calculation speed and poor stability. The implicit regression and explicit calculation method is one of the suitable, fast and stable methods to calculate refrigerant thermodynamic properties for simulation of refrigeration systems.

Besides the thermal properties, the noise generated by refrigeration systems and their components should be a concern of the designer. But the simulation techniques for the noise of refrigeration system only focus on aerodynamic noise at current stage. There is still a lack of publications on refrigerant flowing noise simulation, vibration noise simulation and other type of noise simulation for refrigeration systems. More attentions should be paid on noise simulation techniques.

Techniques to assist engineers to feel easy in developing or operating simulation software and to well use the simulation results in product development processes are required and will be developed in the future. Such techniques include: general refrigeration system simulation platform based on graph theory, model-based intelligent simulation technique, and combination of knowledge engineering methodology with simulation.

Nanofluid might be used widely in the future. The calculation method for nanofluid only focuses on the thermal conductivity at present, and should be extended later.

References

- [1] G.L. Ding, C.L. Zhang, Simulation and Optimization of Refrigeration and Air Conditioning Appliances, Science Press, Beijing, 2001 (in Chinese).
- [2] G.L. Ding, C.L. Zhang, Intelligent Simulation of Refrigeration and Air Conditioning Appliances, Science Press, Beijing, 2002 (in Chinese).
- [3] J. Chi, D. Didion, A simulation of the transient performance of a heat pump, International Journal of Refrigeration 5 (3) (1982) 176e184.
- [4] W.E. Murphy, V.W. Goldschmidt, Cycling characteristics of
- a residential air conditioner-modeling of shutdown transients, ASHRAE Transactions 92 (1A) (1986) 186e202. [5] J.W. MacArthur, E.W. Grald, Unsteady compressible two-phase flow model for predicting cyclic heat pump
- [5] J.W. MacArthur, E.W. Grald, Unsteady compressible two-phase flow model for predicting cyclic heat pump performance and a comparison with experimental data, International Journal of Refrigeration 12 (1) (1989)

29e41.

- [6] D.S. Jung, R. Radermacher, Performance simulation of a two- evaporator refrigerator-freezer charged with pure and mixed refrigerants, International Journal of Refrigeration 14 (5) (1991) 254e263.
- [7] S.M. Sami, A. Dahmani, Numerical prediction of dynamic performance of vapor-compression heat pump using new HFC alternatives to HCFC-22, Applied Thermal Engineering(8) (1996) 691e705.
- [8] T. Pfafferott, G. Schmitz, Modeling and transient simulation of CO2-refrigeration systems with Madelia, International Journal of Refrigeration 27 (1) (2004) 42e52.
- [9] S.G. Kim, M.S. Kim, Experiment and simulation on the performance of an auto cascade refrigeration system using carbon dioxide as a refrigerant, International Journal of Refrigeration 25 (8) (2002) 1093e1101.
- [10] D. Li, E.A. Groll, Transcritical CO2 refrigeration cycle with ejector-expansion device, International Journal of Refrigeration 28 (5) (2005) 766e773.
- [11] R. Shah, A.G. Alleyne, C.W. Bullard, Dynamic modeling and control of multi-evaporator air-conditioning systems, ASHRAE Transactions 110 (PART 1) (2004) 109e119.
- [12] P.C. Zhao, G.L. Ding, C.L. Zhang, L. Zhao, Simulation of a geothermal heat pump with non azeotropic mixture, Applied Thermal Engineering 23 (12) (2003) 1515e1524.
- [13] T. Chikahisa, H. Matsuo, T. Murayama, Investigations on compact and high-performance heat pumps for cold regions (2nd report, estimation of performance improvement by combining heat storage system.

Steady state Thermal Analysis of IPMSM with Water Cooling Jacket for Railway Vehicles using ANSYS

Omshankar Jhariya¹,Raji N.Mishra²

¹Research Scholar, Department of Mechanical Engineering, SORT, PU, Bhopal, Email- omshankar290@gmail.com ²Associate Professor and Head, Department of Mechanical Engineering, SORT, PU, Bhopal, India, Email rajimishra99@gmail.com

Abstract

Thermal analysis of electrical and mechanical components is an important criteria for design of motors and for choosing adequate cooling system to assure their optimum performance and reliability. Thermalbehavior of IPMSM is depends on motor geometry. Thermal analysis of IPMSM motor with water cooling jacket is being analysis by using ANSYS. Initially three dimensional solid model has been created in unigraphic & then finite element analysis is carried out in thermal steady state thermal workbench of ANSYS. It is important to have an efficient cooling for the IPMSM to generate high heat dissipations. Temperature, convection, total heat flux, directional heat flux been analysis in the solid modal of water cooling jacket of IPMSM used in railway vehicle. The results obtained shows the effectiveness of the designed of the IPMSM to its thermal behavior.

Keywords: Interior Permanent Magnet Synchronous Motor, IPMSM, Water Cooling Jacket, Thermal Analysis, ANSYS, Finite Element Analysis.

1. Introduction

Interior permanent synchronous motor produced torque based on two different mechanisms. The first is permanent-magnet torque which is generated by the flux linkage between the permanent magnet motor field and the electro-magnetic field of the stator. IPMSM designs produce a second force known as reluctance torque. IPMSM machine with distributed windings typically do not generate a significant amount of heat in the rotor-roughly 90% of the motor losses tend to occur in the stator, Which can be easily cooled by heat sinking, oil cooling, or water cooling.[13]. Fig 1 **shows Interior Permanent Magnet Synchronous Motor (IPMSM).**



Fig 1. Interior Permanent Magnet Synchronous Motor (IPMSM)

ISSN No.2278-8050

The Interior permanent magnet synchronous motor for the railway vehicle is installed on the axles of the bogie which is located on the lower part of the vehicle. Due to influence of the rail track environment, there is a large amount of dust blown during vehicle operations. However, the totally enclosedmotor, which has a problem for cooling, is not asuitable structure for the Interior Permanent Magnet Synchronous Motor (IPMSM) which has a permanent magnet embedded in the rotor. Especially, in recent scenario, where the downsizing of the traction motor both in size and weight is greatly in demand, research on a separatecooling device for the IPMSM is need to have a competitive edge.

In general, there are three cooling methods for the traction motor: natural air-cooling, forced aircooling, and forced coolant cooling [1]. Among these, forced coolant cooling has the best cooling capacity. The smallest-sized traction motor is able to be designed if forced coolant cooling is applied to find out IPMSM. Research on the above is essential: a) prediction of heat generated from inside the IPMSM which is designed to have high current density, b) design of cooling channel and device to efficiently discharge the heatgenerated inside the IPMSM to the outside, and c) a heatanalysis technique to predict the cooling capacity of the designed cooling channel and device [1].

To calculate the thermal behavior of the machine ANSYS Fluent is used. This is a highly sophisticated finite element modeling and analyzing tool. It can be used to analyze complex problems in fluid and thermal processes.[12]

Thermal management of the IPSMS is important because the electrical insulation has a temperature limits, and cooling system affects its performance [11]. Therefore, in this paper, the water coolingmethod among the forced coolant cooling methods is considered to be applied to the IPMSM. Three dimensional solid modal has been created in unigraphic& then finite element analysis is carried out in thermal steady state thermal workbench of ANSYS. Then, based on the results obtained from thermal property analysis, design has been introduced.

2. METHODOLOGY

For FE analysis of IPMSM, firstly three dimensional solid modal of IPMSM is being/created, with the help of unigraphic. Solid modal of IPMSM is designed by using following dimensions – case size is 250 mm (outer diameter) and 200 mm (inner diameter), a pipe diameter is 10 mm is used with no. of turns 8 present in the solid modal case. Radius of pipe is taken 112.5 mm with & pitch 20 mm.Dimensions solid modal of IPMSM case is created then the armature of IPMSM is made by using diameter 200 mm the both case and armature IPMSM copper material in used to make pipe and cast iron material in used to make frame of model. Once solid model has been create the model in export ANSYS for FE analysis.



Fig. 2 Solid models of Interior Permanent Magnet Synchronous Motor

After creating a solid model of IPMSM, finite element analysis is done in ANSYS for FE analysis mesh is generated for IPMSM solid model. Thermal steady state on engineering data such as thermal properties of cast iron, there meshing is generated. The following table 1 shows the various specifications used for analysis of IPMSM Water cooling jacket.

Contents	Model	Unit
Pipe material	Copper	-
Frame material	Cast iron	-
Total channel length	8	m
Pipe diameter	10	mm
Inlet water temp.	20	°C
Surrounding temp. of pipe	70	°C

Table 1. Main specifications of Water-cooling Jacket

2.1 Description of solid modal with meshing

The three dimensional finite element solid model of IPMSM consist of 164623 total numbers of nodes and 103532 numbers of elements while applying tetrahedron meshing techniques. Properties of modal volume 5.6611e-003 m³ and mass 44.44 kg of solid model used to create meshing ANSYS.Meshing on solid model is shown in fig 3.



Fig. 3 Meshing Geometry of Solid Model of IPMSM Fig. 4 Boundary Conditions Applied on IPMSM Model

3. Boundary conditions

For a simple thermal analysis, homogeneous material (copper), IPMSM model is solid and inflexible. The three dimensional finite element model of IPMSM imported in ANSYS. After applying meshing boundary conditions were applied along with assumptions.

The following assumptions are made to simplify the numerical simulation:

- The ambient temperature is constant
- The heat losses are considered to be homogenously distributed
- There is no influence of temperature rise on the thermal property of materials
- The insulation material is evenly distributed and the impregnation is good.

The surrounding temperature 20°C, convection temperature is 27°C and heat flow temperature is 70°C is applied as boundary conditions of solid model of IPMSM is shown fig. 4For the flow outlet the standard pressure outlet conditions were used.

4. Results and discussion

All the temperature described results in a heating which must be evacuated. Certain materials such as isolating and copper are sensitive to heat. It is thus necessary to transfer this heat towards a cooling system. The three dimensional solid model of IPMSM generatedin ANSYS workbench provide a very fine, good, and fast meshing of geometry representation of IPMSM with accuracy. This result depends on the accuracy of FE analysis solid model of IPMSM with reference to real conditions. This study investigates temperature distribution, total heat flux, directional heat flux, and convection during steady state conditions. Results shows that minimum temperature 19.999 and maximum 22.597°C, heat flux generates minimum 4.1779 w/m2 and maximum 4816.9 w/m2, directional heat flux minimum -4020.3 w/m2 and maximum 4151.8 w/m2 generated at IPMSM modal. From the results it is clear that the water cooling is also the better solution to cooling the IPMSM. All of these shows onFig.5 shows results of modal all conditions fig (a), (b), (c). This modal is useful for mechanical operations.





Fig.5 Shows Results of Modal All Conditions

References

[1] A. F. Armor, and M. V. K. Chari, "Heat flow in the stator core of large turbine-generators by the method of three dimensional Finite Elements (Part II: Temperature distribution in the stator iron)," IEEE Transactions on PAS, PAS-95(5), pp. 1657-1668, 1976.

[2] C.B Park, H.W. Lee, B. S. Lee, "A Study on the Reduction of the Stator Iron Loss on Permanent Magnet Synchronous Motor for light Railway Transit Propulsion System," Journal of the Korean Society for Railway, Vol.15, No.4, pp. 376-380, 2012.

[3] C.B Park, H.W. Lee, B. S. Lee, "Investigation of a thermal analysis method for IPMSM in railway vehicles,"

Journal of the Korean Society for Railway, Vol.16, No.2, pp. 99-103, 2013.

- [4] C. B. Park, "A Study on the Thermal Characteristics of 110kW-class IPMSM for Light Railway Transit using the 3-Dimensional Thermal Equivalent Network considering Heat Source by Iron Loss Density Distributions," The transactions of the Korean Institute of Electrical Engineers, Vol. 62, No. 7, pp. 038-1044, 2013.
- [5] Y. Bayazitoglu and M. N. Ozisik, "Element of Heat Transfer." New York: McGraw-Hill, 1988.
- [6] F. Kreith and M. S. Bohn, "Principles of Heat Transfer: 5th edition," St. Paul, MN: West Publishing, 1993.
- [7] T. Jokinen and J. Saari, "Modeling of the coolant flow with heat flow controlled temperature sources in thermal networks," IEE Proceeding of ElectricalPower Applications, Vol.144, No.5, 1997.
- [8] J.H. Choi, S.M. Jang, C. Han, J.H. Ahn, K.H. Sim, "Electromagnetic loss and thermal analysis on high speed PM motor for turbo compressor," KIEE Summer Conference 2012, pp. 618-619, 2012.

[9] J. Driesen, R. J. M. Belmans, and K. Hameyer, "Finite-element modeling of thermal contact resistances and insulation layers in electrical machines," IEEETransactions on Industry applications, Vol.37, No.1, pp. 15-20, 2001.

- [10] Batchelor, G. K., "An Introduction to Fluid Dynamics," Cambridge University Press, 1967.
- [11] Journal of Asian Electric Vehicles, Volume 6, Number 2, December 2008
- [12] Alexander Nollau is with the Institute for Electrical Drives, Universitaet der Bundeswehr Muenchen, 85579, Neub

[13] <u>www.motioncontrolonline.org/contant-detail.cfm/motion-control-technical-feature/interior/permanent/motor</u>, 13/02/2017.

Science & Technology for Specially Abled Persons

Shashank Mehrolia^{*1}, Eisha Ganju², Alka Singh³

Student, School of Pharmacy & Research, People's University,Bhopal 462037.
 Associate Professor, School of Pharmacy & Research, People's UniversityBhopal462037.
 Assistant Professor, School of Pharmacy & Research, People's UniversityBhopal462037.
 Corresponding Address: <u>eishaganju26@gmail.com</u>

ABSTRACT

Differently abled people are no different from normal people in using technology, if they are also considered as the end users. Not all humans are born same. Neither do they have the capability to do everything by their own. In the present scenario, there is a lot of distinction shown between normal and differently abled people. There are a lot of practices that are being followed to make everything possible, to be Universal. Providing a Barrier free built environment is taken as a major consideration these days. However, technology should act as an advantage for differently abled people by helping them mobilize things on their own. Using the present day technology, one should always see to provide maximum benefits to the differently abled people that may not be possible without these inventions. One needs to think under the same criteria of how well and equally the differently abled people are being treated in the society by considering them as well, as the users of the innovations and technologies. This paper looks into understanding the need for Technological advancements that can benefit the differently abled people not only in assisting themselves, but also in accessing everything possible. This paper illustrates the significance of giving consideration to differently abled people while developing a new technology that would allow them to ultimately live a better life.

Keywords: Technology, Differently abled, Way finding, Universal, Assistive technology, Adaptive technology, Impairments.

1. INTRODUCTION

Technological advancements have made lives easier and it would be a never ending process. One would even totally rely on technology in the near future. In this case it can benefit the differently abled user group in a much better way. Technology can help all kinds of user group irrespective of their ambulatory conditions or any other impairment. Normal people would just use it. Whereas, differently abled people will gain something out of it. "The use of the term universal is unfortunate in that "*Nothing can be truly universal; there will always be people who cannot use an item no matter how thoughtfully it is designed. "-Ron Mace* .In contradiction to the above statement by Ron Mace who coined the term Universal Design, his enormous efforts in designing products and the spaces to be aesthetic, as well as usable to all types of user group regardless of their ability or status in life, marks as an example, in developing technology with the same criteria.⁽¹⁾

2. VARIOUS TECHNOLOGIES FOR DISABLED GROUPS

C. 2.1 Braille e -book reader

Well, everyone knows how important Internet can become and of course e-books and edocuments. So, how can blind people benefit from internet. How can they use internet efficiently. The amazing Braille e- reader a Kindle style e- reader, makes blind and partially sighted people to read easily. Its alphabets enable them to read by tracing lines of raised bumps with the help of their fingers. It also helps in understanding graphics, figures and even graphs.

D. 2.2 Dot

Dot is wearable smart watch that works for blind people and helps them to access tweets, messages anytime and anywhere right from their smart phone. The device connects with any smart phone via Bluetooth and translates the text on its screen. The smart phone features alarm, notifications, touch sensor, Bluetooth 4.1 and Gyroscope.

dot :

E. 2.3 Finger Reader

Finger Reader is a wearable tool that helps in reading. The device helps visually impaired people to read any printed book or anything on any electronic device. Finger Reader includes a small camera that scans the text and provides real-time audio feedback of the detected words.

2.5 The Light Stick

The light stick is used for obstacle sensing and alerting. The detachable hand grip can convert the text messages to audio and that can be transmitted to the Bluetooth connected earpiece worn by the user. An emergency switch is located on the stick that can help in extreme situations.

2.6 Hearing loop aid

Amplified sound travels through the loop and creates an electromagnetic field that is picked up directly by a hearing loop receiver or a telecoil, a miniature wireless receiver that is built into many hearing aids. To receive the signal, a listener must be wearing the receiver and be within or near the loop. As the sound is taken up directly by the receiver, the sound is much clearer, without as much of the competing background noise associated with many listening spaces. Some loop systems are portable, making it accessible for people with hearing loss to improve their hearing environments, as required, as they proceed with their daily agenda's. A hearing loop can also be connected to a public service system, a television, or any other audio source that produces sound.

School of Research & Technology







Hearing aids with embedded systems of telecoils or portable loop receivers are also available that gives a choice of selection for the users.



3. CONCLUSION

Disability is a phase in everyone's life which can be a parent with a pram, a person with an injured leg, a child in his infant age, the elderly people or any disability by birth. Treating the problems of all and giving solutions to it in the form of technlogical innovations, it would tend to provide a platform for the disabled to feel normal. This particular aspect has to be ensured to make anything Universal. Developing technology that can help the people with disabilities means giving them a new life or a better life which they once lived.

4. REFERENCES

[1] NC State University-College Design. (n.d.). The centre for universal design. Retrieved april 13,2015,

[2] Y.Kumari, "10 Gadgets That Can Help Differently Abled People", -Technology Blog, May 9, 2016.

[3] Byung-Seop SongPhD., C.-G. K.-Y.-H.-M. (2007). Development of Wearable Guide System for the Blind. RESNA Rehabilitation Engineering and Assistive Technology Society of North America. Daegu University, School of Rehabilitation Science, Daegu, Korea.

[4]Disorders, N. I. (2014 July 03). Assistive Devices for People with Hearing, Voice, Speech, o Language Disorders. Retrieved fromhttp://www.nidcd.nih.gov/health/hearing/pages/assistive-devices.asp.

A New Method of Neural Network Based Fast Fractal Image Compression

Ashok Agarwal¹, Amit Sawaskade², Hitesh Chandak³

1Ph.D Scholor , Dr. K. N. Modi University, Rajasthan, India 2Associate Professor, ECE, JNCT, Bhopal, India 3Assistant Professor, ECE, SORT, People's University. Bhopal, India 1ashok.jnct@gmail.com <u>2 amit.sawaskade@gmail.com</u> <u>3 chandakhitesh@gmail.com</u>

Abstract

Fractal compression is a loss compression method for digital images, based on fractals. The method is best suited for textures and natural images, relying on the fact that parts of an image often resemble other parts of the same image. Fractal Image Compression (FIC) techniques take more time to perform processes are encoding and global search. Many different researchers and companies are trying to develop a new algorithm to reach shorter encoding time and smaller files. But there are still some problems with fractal compression. Fractal image compression is promising both theoretically and practically. The encoding speed of the traditional full search method is a key factor rendering the fractal image compression unsuitable for real-time application. The primary objective of this paper is to investigate the comprehensive coverage of the principles and techniques of fractal image compression. The experimental result shows that the application of the designed hybrid image compression method can increase the signal-to-noise ratio of an image while the high compression ratio of the image is guaranteed.

Keywords- Contractive transform, domain classification and feature vector, Partial discharge image, pattern recognition, fractal image compression.

1. Introduction

Though there are many kinds of image encoding method, the characteristics of compression effect the compression ratio and the time duration of encoding and decoding of traditional encoding method, M. Barnsley introduced the fundamental principle of fractal image compression in 1988 [2]. Fractal theories are totally different from the others. Fractal image compression is also called as fractal image encoding because compressed image is represented by contractive transforms and mathematical functions required for reconstruction of original image, instead of any data in pixel form. Contractive transform ensures that, the distance between any two points on transformed image will be less then the distance of same points on the original image [2]. These transforms are composed of the union of a number of affine mappings on the entire image, known as iterated function system (IFS) [1], [2]. Barsnley has derived a special form of the Contractive Mapping Transform (CMT) applied to IFS's called the College Theorem [1, 2]. The usual approach of fractal image compression is based on the college theorem, which provides distance between the image to be encoded and the fixed point of a transform, in terms of the distance between the transformed image and

the image itself. This distance is known as college error and it should be as small as possible.

A.E. Jacquin gave first publication on Fractal image compression with partitioned IFS (PIFS) in 1990 [1], [4], [5]. In Jacquin's method the image is partitioned in sub images called as 'Range blocks' and PIFS are applied on sub-images, rather than the entire image. Locating the range blocks on their respective position in image itself forms the entire image. Temporary images used to form range blocks are known as domain blocks. The overall process of fractal image encoding includes four levels of decision-making. A wide variety of methods have been suggested for every level. For a given degree of image compression we get moderately better signal to noise ratios to get good image quality in retrieved image. Medical Image compression using fractal concept would tend to arrive at higher compression rates and fractal zooming further allows us to increase the size of the image however the loss of information in fractal compression is unacceptable in medical imaging. Lengthy encoding process is another drawback of fractal compression as it leads to increase in computational encoding complexity. This paper addresses to above mentioned issues of fractal image compression. This paper is organized as follows. Section 2 briefs about the standard Fractal image compression method. Section 3 explains the proposed Fractal coding algorithm-I and proposed Fast Fractal coding algorithm-II based on neural based Machine learning. Section 4 deals with results and discussions. Section 5 derives Conclusion followed by acknowledgements and References

2. Standard Fractal Image Compression Method

A two dimensional image is represented mathematically as z = f(x, y) where f(x, y) represents the gray level with 0 being black and 1 being white at the point (x,y) in an image. I denote the close Interval [0 1] .On applying transformation 'W', on to the image 'f', we get a transformed Image W(f).W always moves points closer together as it is contractive. Affine transformations are combinations of rotations, scaling and translations of the coordinate axes in n-dimensional space which always map squares to parallelograms. The general form of affine transformation is given by

$$W = \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} + \begin{bmatrix} e \\ f \end{bmatrix} = \begin{bmatrix} ax + by + e \\ cx + dy + f \end{bmatrix}$$
---- (1)

If the translations (e & f), scaling factors(r & s) and rotations ($\theta \& \phi$) are known in advance, then the coefficients may be calculated. The transformation found suitable for encoding gray scale images thought of as a three dimensional image with coordinates as x & y and intensity as z is given in equation 2 where si controls the contrast and oi controls the brightness of transformation.

$$\underset{z}{\text{wi}} \begin{bmatrix} x \\ y \\ z \end{bmatrix} - \begin{bmatrix} ai & bi & 0 \\ ci & di & 0 \\ 0 & 0 & si \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} + \begin{bmatrix} ei \\ fi \\ oi \end{bmatrix}$$
 -----(2)

An image is encoded as the attractor of an iterated function system in fractal compression. The observation "Natural images are partially self transformable" forms the basis for image encoding. They possess "affine redundancy" in the aspect that a block in the image (called range) can be

ISSN No.2278-8050

derived from another block of the same image (called domain) by some affine transformation. On encoding, the image is represented as the union of best-fitting affine transformation and the equivalent image domain blocks for all segments satisfying of the image support. In every fractal encoding method, the encoding process begins with division of the image into a set of non-overlapping segments(range blocks), followed by the search for an image block (domain block) with different resolutions that gives the best affine mapping to the range segment for each range block. Compression is accomplished by encoding the domain and the affine transformation for each range block [9].

3. Image Quality Assessment

Image Quality Assessment in Image Processing plays an important role, as image processing algorithms and systems design benchmarks to help assess the best or the quality of the results. At present more commonly used by the image quality index for the assessment of Mean Square Error (MSE) and the Peak Signal to Noise Ratio (PSNR), respectively, are defined as follows:

$$MSE = \frac{1}{N} \sum_{i=1}^{N} (x_i - y_i)^2 - \dots (3)$$
$$PSNR = 10 \times \log \frac{255^2}{MSE} - \dots (4)$$

where N is the size of image, xi and yi are the gray level of pixel of original image and test image However, these common approach, focused on the image gray value of the mathematical model to quantify the numerical standards, although with an objective assessment, but not all of the assessment results can meet the human visual judgement. By Figure 1 can be found in the Test Signal 1, Test Signal 2 and Original Signal Error Signal of the MSE results are the same, but the human visual judgement can be found Test Signal 1 is closer to Original Signal.



Figure 1. MSE distortion of the signal different

A. Full Search Fractal Image Compression

Fractals are mathematical sets that exhibit self-similarity under all scales of magnification. In fractal image coding an arbitrary image is encoded into a set of equations. These equations are usually affine transformations that transform a sub-image, called a domain block u, into another sub-image, called a range block v. In addition, to be calculated MSE given range block v, to find a domain block u, p and q to make $d = kp \notin u + q$; vk minimum, p and q is define as follows:

$$p = \frac{N \times \sum_{i=0}^{N-1} u_i v_i - \sum_{i=0}^{N-1} u_i \sum_{i=0}^{N-1} v_i}{N \times \sum_{i=0}^{N-1} u_i^2 - \left(\sum_{i=0}^{N-1} u_i\right)^2}$$
$$q = \frac{1}{N} \left[\sum_{i=0}^{N-1} v_i - p \sum_{i=0}^{N-1} u_i \right] \dots (5)$$

An image is divided into non-overlapping range blocks, and a search for a best matching domain block is performed for each range block. Domain blocks are usually larger than range blocks, and are similar to one another under that affine transformation.



Figure 2. Fractal Image Encoding



Figure 3. Fractal Image Decoding



Figure 4. The World flow of Edge Oriented Classification

4. Conclusion

In this paper, the Structure Similarity and block property classifier employed for the fractal image compression is investigated. Experimental results show that the visual effect is better and the encoding speed is 10 times faster than that of the full search Some decoded PD images may not achieve the requirement for recognition even though the compression error is controlled to be small. Considering feature errors and visual qualities of decoded images

References

[1] A. Lapp and H. G. Kranz, "The Use of the CIGRE Data Format for PD Diagnosis Applications", IEEE Trans. Dielectr. Electr. Insul., Vol. 7, pp. 102–112, 2000.

[2] E. Gulski, "Computer-aided Measurement of Partial Discharges in HV Equipment", IEEE Trans. Electr. Insul., Vol. 28, pp. 969-983, 1993.

[3] E. Gulski, "Digital Analysis of Partial Discharges", IEEE Trans.Electr. Insul., Vol. 2, pp. 822-837, 1995.

[4] J. Li, C. Sun, L. Du, X. Li and Q. Zhou, "Study on Fractal Dimension of PD Gray Intensity Image", Proc. Chinese Soc. Electr. Eng., Vol. 22, pp. 123-127, 2002 (in Chinese).

[5] E. M. Lalitha and L. Satish, "Fractal Image Compression for Classification of PD Sources", IEEETrans. Dielectr. Electr. Insul., Vol. 5, pp. 550-557, 1998.

[6] A. Krivda, E. Gulski, L. Satish and W.S. Zaengl, "The Use of Fractal Features for Recognition of 3-D Discharge Patterns", IEEE Trans. Dielectr. Electr. Insul., Vol. 2, pp. 889-892, 1995.

[7] H. O. Peitgen, H. Jurgens and D. Saupe, Chaos and Fractals: New Fontiers of Science, Springer-Verlag New York, Inc. 1992.

[8] A. E. Jacquin, "Fractal Image Coding: a Review", Proc. IEEE, Vol. 81, pp. 1451-1465, 1993.

[9] J. Li, C. Sun, S. Grzybowski and C.D. Taylor, "Partial Discharge Recognition by Using a Group of New Feature", IEEE Trans. Dielectr. Electr. Insul., Vol. 13 (pp. 1245-1253, 2006.

[10] J. Li, Study on Methods of Recognition Feature Extraction and Fractal Compression for Partial Discharge Gray Intensity Images", Ph.D. Dissertation, Chongqing University, 2001 (in Chinese).

[11] M. F. Barnsley, R. L. Devaney, B. B. Mandebrot, H. O. Peitgen, D. Saupe and R. F. Voss, The Science of Fractal Images, Springer-Verlag New York, Inc. 1998.

[12] S. Chen and L. Zhang, Fractal and Image Compression, Shanghai Science-Technology and Education Publishing Company Press, Shanghai, 1st Edition, (in Chinese), 1998.

[13] R. C. Gonzalez, R. E. Woods and S. L. Eddins, Digital Image Processing Using MATLAB, Prentice Hall; 1st Edition, 2003.

An Improved Brain Tumor Detection by using Modifed fuzzy C–Means Method

Syed Faizan UI Aziz¹, Prof. Neelesh Gupta², Prof. Neetu Sharma³

1M.Tech (Digital Communication)Truba Institute of Engg. & Information Technology1Bhopal, India sf050990@gmail.com1

Abstract

Image segmentation refers to the process of partitioning an image into mutually exclusive regions. It can be considered the most essential and crucial process to facilitate the delineation, characterization and visualization of regions of interest in any medical image. Despite intensive research, segmentation remains a challenge due to the content of various images, cluttered objects, occlusion, image noise, non-object texture and other factors. There are many algorithms and techniques available for image segmentation but still there needs to develop an efficient, fast technique of medical image segmentation. Previous methods of Brain tumor segmentation has some limitations line the method was a quite complex as it takes more time consuming, area calculated was not that accurate, the final cluster does not clearly define the exact position, shape, size of tumor. These all points has been covered in this proposed method and the improved and bit accurate result has shown. In the proposed work the Fuzzy C Mean technique has been modified named as modified fuzzy c mean (MFCM). Morphological operations along with FCM are used to improve the accuracy of the tumor area detection. The accurate position, shape, size and stage of the brain tumor can be achieved by this method. Time complexity has been removed as iterations takes lesser time, exact position and area of tumor can be achieved. Also it shoes shows better result as compare to other previous method in terms various parameters like SSIM, PSNR. MSE.

Keywords; SSIM, MSE, MFCM, FCM, Clustering and brain tumor

1. Introduction

The body consists of billion live cells. Normal body cells grow, divide to make new cells, and die in an orderly manner. During the early years of the life of a person when they are growing, normal cells divide faster. Once a person becomes an adult, most cells divide only to replace worn, damaged or dying cells.

Cancer begins when cells in a part of the body begin to grow out of control. There are many types of cancer, but they all start because of the growth of abnormal cells out of control. The growth of cancer cells is different from the normal cell growth. Instead of dying, cancer cells continue to grow and form new cancer cells. In most cases, cancer cells form a tumor. Cancer cells can also turn into (invade other tissues), something that normal cells cannot do. Being able to grow out of control and invade other tissues are what makes a cell a cancerous cell.

The word tumor is synonymous with a neoplasm word that is created by an abnormal growth of tumor cells is something totally different from cancer.



Fig. 1. Brain Tumor [14]

Normally, brain anatomy can be accessed by MRI or CT. In that the digitized MRI image is taken for the whole process. MRI is more comfortable than the scanner for diagnosis. It not affect the human body. Because it does not use radiation. It is based on radio waves and magnetic fields. There are various types of algorithms have been developed for the detection of brain tumors. But they may have some drawback in the detection and extraction.

Literature Review

In this research work the implementation of Simple Algorithm for detection of range and shape of tumor in brain MR images. Tumor is an uncontrolled growth of tissues in any part of the body. Tumors are of different types and they have different Characteristics and different treatment. As it is known, tumor is inherently serious and life-threatening because of its character in the limited space of the intracranial cavity (space formed inside the skull). Random Walker

L. Grady [11] proposed random walker which is seeded segmentation method. The image is represented by a weighted graph. For each pixel, the probability is calculated for the chance of a random walker from the pixel to reach seeded pixels. The weights of the graph edges are often calculated from the differences of gray levels, and the final segmentation is obtained by labeling the pixel after which the seed point earned the highest probability for the random walker.

Random walker does not work very well for the case of liver tumor with ordinary Gaussian filtering. The limits were too low to be segmented correctly. When filtering the image with an anisotropic diffusion filter (a filter that reduces image noise without destroying the strong image borders), the result could be somewhat improved, and the method did find some of the tumor, but a leak easily.

Super Paramagnetic Clustering

Marcelo Blatt [9] proposed a method of super paramagnetic cluster based on the Potts model, which describes the behavior of a system of ferromagnetic grains. The segmentation label is reflected by the grain orientation and the segmentation is obtained when the equation reached steady state. This is a fully automatic method where the initial state of "grains" are randomly selected and then evolved with an energy function that takes gray scale values of the image into account. The reason for implementing in this study was due to the speed of the algorithm. When implemented on the GPU of the method has been able to operate in real time, processing of an

ISSN No.2278-8050

image of 256×320 pixels at a speed of 30 Hz field. Unfortunately, the results of the two test images and real images were poor. The algorithm could not seem to handle the high noise level and low limits of CT-images. Even on the test image, which is simpler than the actual image, we can see clearly that the image was more segmented.

Region Growing

Qi et al. [12] proposed region growing which a basic segmentation method is belonging to the third category of method, where the user mark seed points for the foreground and background. Marked the first plane functions as an initial segmented region which is developed by morphological dilation if the neighborhood fills a kind of similarity criteria. Expansion continues until no more neighboring pixel fulfill the criteria and can be added to the area or until the maximum number of iterations is reached. The similarity criteria used in this thesis is based on a Bayesian system of rules. In this method, we get a fast, probability based, which could be interesting for viewing and uncertainty for interactivity.

Proposed Methodology

This method however finds local optimum and run over multiple times to find correct output. The input arguments of this function fuzzy C means is the data set and number of clusters (first cluster belongs to tumor part and second cluster belongs to non-tumorous part) and the output is final matrix cluster centers and intermediate values of objective functions during iterations. Mathematical representation

Fuzzy C-means (FCM) is the clustering algorithm which allows one piece of data may be member of more than one clusters. It is based on reducing the following function:

$$Y_{m} = \sum_{i=1}^{N} \sum_{j=1}^{C} M_{ij}^{m} ||X_{i} - C_{i}||^{2}$$

$$4.1$$

Where

- m- Any real number greater than 1,
- Mij- Degree of membership of X; in the cluster j,
- x- Data measured in d-dimensional,
- Rj D-dimension center of the cluster,

The update of membership Mij and the cluster centers R,

$M_{ij} = \frac{1}{\sum_{K=1}^{C} \left(\frac{\ X_i - C_i\ }{\ X_i - C_i\ }\right)^{\frac{2}{m-1}}}$	4.2
$R_j = \frac{\sum_{i=1}^N x_{i.} M_{ij}^m}{\sum_{i=1}^N M_{ij}^m}$	4.3

The above process ends when,

$$\max_{ij} \left\{ |M_{ij}^{(K+1)} - M_{ij}^{(k)}| \right\} < \delta$$
4.4

Where

 δ = termination value or constant between 0 and 1,

K= no of iteration steps.

Various steps of proposed algorithm are as following

Step-1: Select an input image:

This step includes the selection of input image. These images are MRI and CT scan images in JPEG or JPG format. Select any one of these MRI or CT scan images.

Step-2: Take Discrete Wavelet Transform of selected Image:

When discrete wavelet transform is taken, it divide the image into different frequency sub-bands named as LL, LH, HL and HH. Out of the four resultant frequency sub-bands images comes from Discrete Wavelet Transform, the image with high intensity is taken to further proceed.

Step-3: De-noising of Image:

De-noising of image is done with the help of median filter. Median filter remove the salt and pepper noise present in the image and the resultant image is now noise free and clearer.

Step-4: Take inverse wavelet transform

Inverse Wavelet Transform is taken of resultant de-noised image. By taking inverse wavelet transform all four frequency sub-band images (including the de-noised high intensity image) are interpolated and form a de-noised image.

Step-5: Apply fuzzy C-means algorithm

For the improvement of fuzzy c mean algorithm reduced the number of cluster of the fuzzy algorithm. In general calculate the 5 cluster here in the proposed method calculate the less number of cluster that is four. In the above part of the proposed method shows the fuzzy c means algorithm flow chart and detailed description. The resultant image of discrete wavelet transform is

further proceed by applying fuzzy C-means algorithm. This algorithm is proceed as follows: Fuzzy C-means algorithm includes segmentation of the image into four clusters because the cluster number is in which the cluster is to be divided is fixed with K=4

The Cluster center is calculated by using following equation:

$$M=\frac{\sum_{i:c(i)=k}x_i}{N_k}$$
 , $k=1,\ldots\ldots,4$

Where, M= mean

K= number of clusters

Modified

Step-6: Feature extraction

Feature extraction is done by using thresholding method:

$$g(n) = \begin{cases} '1' \text{ if } f(n) >= 200 \\ '0' \text{ if } f(n) < 200 \end{cases}$$

Where, f(n)= image

In this thresholding algorithm the pixels with value greater than or equal to 200 is to be considered as the pixels of object and thresholding method make these pixels more bright. Pixels with value less than 200 are made darker by thresholding method. The resultant image shows the object i.e. the tumor portion clearly.

Step-7: Morphological operation

Morphological operation on the resultant image is applied by canny edge detection method. The canny edge detection method shows the exact area or outline of the tumor. The canny edge detection method converts the image into binary form and verifies the actual tumor portion of output image of thresholding.

There are different type of morphological operation perform to improve the result of proposed method. For analyzed the extra part of the output of modified fuzzy c means using the edge detection. After the edge diction calculate the graded index of image further it convert into the binary image and apply the still function for smoothing the border. Also apply the graded index of binary image and filling the internal part of tumor by using imfill function. There are some major morphological operation operate in the proposed method.

Step-8: Area calculation:

The resultant have sharper tumor portion. For area calculation first the number of white or bright pixel of image is calculated which are tumor pixels:

No. of white pixel, P =
$$\sum_{W=0}^{255} \sum_{H=0}^{255} [f(1)]$$
 4.9

Where, P= number of white pixels

Now the area of this tumor with the help of number of white pixels is calculated by following equation:

size of tumor,
$$S = [P * 0.264] mm^2$$
 4.10

Step- 9: Calculate the other Performance parameters:

After the calculating area calculate the other result parameters like peak signal to noise ratio (PSNR), mean square error (MSE), structural similarity index measurement (SSIM) and timing calculations of proposed method with compare to k-means algorithm and fuzzy C means (FCM) algorithm.

Simulation and Result

The proposed method is designed into the MATLAB environment. For the implementation of proposed work used the MATLAB R2013a version.

The proposed algorithm for MRI image brain tumor detection using modified fuzzy c-mean with morphological operation (MFCMMO). The proposed algorithm is simulated in the MATLAB R 2013a programming language. For perform the operation using the dual core laptop with 1GB RAM.

Simulated outcome of proposed method

For the simulation of proposed work use the standard data set that is taken by DICOM data set. DICOM provide different data set for medical as well as other image data set. The proposed work is focused on the tumor images. There are different tumor image are available in which perform the proposed method on different image and compare the outcome with 3 images all three images are shown in base paper also.

Data set Image

The tumor data set images are shown in below. There are three different tumor images are shown in below in fig 2(a), 2(b) and 2(c). These are three images used to calculate the outcome of proposed phenomena.



2 (a) Data set image a, 2 (b) Data set image b, 2 (C) Data set Image c

Fig 2 The DICOM tumor data set

Result of Tumor data set

The result of the proposed method with other method is shown in below. In this section shows the result of the three different methods. The three different methods are k-Means algorithm, fuzzy C–Mean algorithm and final one proposed modified fuzzy C means algorithm with morphological operations.

When Data set image a is taken into concern

So discernible K – means clustering result in below figure 3 (a). This figure shows the result of the K-means algorithm and its five crusted output. On the basic of visual output clearly see that cluster 4 shows the good result. Cluster four shows the detected tumor.

Figure 3 (b) shows the output of the selected tumor that is given by clustered output. Also shows the edges of the tumor part. When detect the edges of the tumor also shows the extra part that is not include in the tumor. So clearly see that if calculate the area to the tumor, shows not an accurate result due to the extra part it cover. So figure 3 (c) shows the extra part detected along with the tumor which is undesired.



3rd Cluster



5th Cluster



2nd Cluster



4th Cluster



Fig 3 (a) Shows the result of the K-Mean cluster based Tumor detection

The above figure shows the outputs of K – Mean the cluster of the tumor data. There are five clusters generated in K means output. In which select the best segmented output that is cluster number 4. The fourth cluster is most subtle rather than others.



The above figure 3 (b) shows the selected outcome of the cluster output data.



Fig 3 (c) Shows the output of the tumor with edge detection of tumor area

After the select of the cluster also detect the edges of the selected cluster. The edges of the cluster shows the accurate area of the tumor image. It contain some extra part that is not shown in normal form. That's why also calculate the edges of the tumor.

In next part of the result check the outcome of the fuzzy C means algorithm that is shown in below figure 4.











Fig 4 (a) Shows the output of the Fuzzy C-Means



Fig 4 (b) Shows the selected cluster of the output



Fig 4(c) the clustered output Fuzzy C mean algorithm and edges of the Fuzzy C Means

Second discernible Fuzzy C– Means clustering result in above figure 4 (a). This figure shows the result of the C-means algorithm and its five crusted output. On the basic of visual output clearly see that cluster number three shows the good result. Cluster three shows the detected tumor.

Figure 4(b) shows the output of the selected tumor that is given by clustered output. Also shows the edges of the tumor part. When detect the edges of the tumor also shows the extra part that is not include in the tumor. So clearly see that if calculate the area to the tumor, shows not an accurate result due to the extra part it cover. So figure 4 (c) shows the two result first one is the edge of the tumor and second one selected cluster. Fuzzy C means algorithm shows more undesired part covered as compared to K Mean algorithm. It means that fuzzy C means contain more error of area calculation as compare to k-means algorithms.

Third discernible Modified Fuzzy C– Means algorithm with morphological operation result in above figure 5 (a). This figure shows the result of the proposed algorithm and its four different clustered output. On the basic of visual output clearly see that cluster number three shows the good result. Cluster three shows the detected tumor.

Figure 5 (b) shows the output of the selected tumor that is given by clustered output. When detect the edges of the tumor also shows the extra part that is not include in the tumor. In further improve the result with the help of morphological operation that is with figure shown in below.

Figure 6 shows the morphological operation of the proposed work shown in figure. There are four different operations. The first one is shows figure 6 (a) binary gradient mask image, the next one figure 6 (b) is dilated gradient mask image, third one figure 6 (c) is internal part filling image using morphological operation imfill and the final one is figure 6 (d) eliminate the extra part of tumor. Due to accurate detection of tumor area calculation is better as compare to fuzzy c means, k- means and other tumor detection methods.

The final image shows the accurate tumor as compare to fuzzy C mean, K-means algorithm. The morphological based enhanced fuzzy c means shows better outcome in terms of visual show also shows the good result in terms of experimental standard parameters like peak signal to noise ratio, mean square error, structural similarity index measurement, time and area also.



Fig 5 (a) shows the clustered output of modified Fuzzy C – Means




Fig 5 (b) shows the selected clustered output of modified Fuzzy C – Means



Fig 6 (a) Binary Gradient Mask, Fig 6 (b) Dilated Gradient Mask



Fig 6 (c) Internal part filling Fig 6 (d) Final tumor image

After the visual comparison of the result now compare the result of the other parameters like PSNR, MSE, SSIM, Area and Time. Compare the result on the standard data set that is shown in above figure of data set.

First compare on the basic of the time that is shown in below. Table 1 shows timing comparison of proposed method with compare to the other method. The result of the tabular form is shown in this table.

Time Comparison					
K Mean	FCM	MFCM			
32.941	33.7535	16.7225			
19.4036	22.2276	19.6662			
11.7811	10.2404	9.0894			
	Nparison K Mean 32.941 19.4036 11.7811	K MeanFCM32.94133.753519.403622.227611.781110.2404			

Table 1 shows the comparison of time

Figure 7 shows the bar graph of the timing comparison of the result. Y axis shows the time consume in second. X axis shows the standard data set images. Here this graph is clearly see

Fig 6 (a) (b) (c) (d) Shows the morphological operation on the cluster out Tumor

that the proposed method provide good result as compare to K means and Fuzzy C means algorithms.



Fig 7 Shows the timing Comparison of different method

After the comparison of timing now compare the area of the proposed method with other methods.

That is shown in below table 2. Table 2 shows the outcome of the area of the different method fuzzy c means k means and proposed method that is shown in the table.

Area Comparison					
Dataset	K Mean	FCM	MFCM		
Image a	5.6806	10.5203	14.153		
Image b	11.275	11.4893	12		
Image c	6.1688	9.878	11.5709		

Table 2 shows the comparison of time

In the above table clearly see the area covered by the proposed method is better as compare the other method like FCM and K means algorithm.



Fig 8 Shows the Area Comparison of different method

Figure 8 shows the bar graph of the area comparison of the result. Y axis shows the area covered by the tumor unit is mm2. X axis shows the standard data set images. Here this graph is clearly see that the proposed method provide good result as compare to K means and Fuzzy C means algorithms.

MSE Comparison			
Dataset	K Mean	FCM	MFCM
Image a	12.2971	12.8974	11.6405
Image b	15.0943	18.1745	15.3451
Image c	11.3019	11.9445	12.3629

Table 3 shows the comparison of MSE

Table 3 shows the comparison of Mean Square Error (MSE) with K-Means, Fuzzy C Means and Modified Fuzzy C Means methods. From the above table it is clearly shows that the MSE of projected work is better than other existing algorithms.



Fig 9 Shows the MSE Comparison of different method

Figure 9 shows the graphical analysis of Mean Square Error (MSE) on with K-Means, Fuzzy C Means and Modified Fuzzy C Means methods. From the above table it is clearly shows that the MSE of projected work is better than other existing algorithms.

PSNR Comparison			
Dataset	K Mean	FCM	MFCM

Image a	37.2328	37.0258	37.4711
Image b	36.3427	35.5362	36.2711
Image c	37.5993	37.3591	37.2096

Table 4 shows the comparison of PSNR

Table 4 shows the comparison of Peak Signal to Noise Ratio (PSNR) with K-Means, Fuzzy C Means and Modified Fuzzy C Means methods. From the above table it is clearly shows that the MSE of projected work is better than other existing algorithms.



Fig 10 Shows the PSNR Comparison of different method

Figure 10 shows the graphical analysis of Peak Signal to Noise Ratio (PSNR) with K-Means, Fuzzy C Means and Modified Fuzzy C Means methods. From the above table it is clearly shows that the MSE of projected work is better than other existing algorithms.

SSIM Comparison					
Dataset	K Mean	FCM	MFCM		
Input Image a	0.2781	0.3176	0.3069		
Input Image b	0.366	0.386	0.386		
Input Image c	0.2563	0.2788	0.2841		

Table 5 shows the comparison of SSIM

Table 5 shows the comparison of structural similarity index (SSIM) with K-Means, Fuzzy C Means and Modified Fuzzy C Means methods. From the above table it is clearly shows that the MSE of projected work is better than other existing algorithms.



Fig 11 Shows the SSIM Comparison of different method

Table 11 shows the graphical analysis of structural similarity index (SSIM) with K-Means, Fuzzy C Means and Modified Fuzzy C Means methods. From the above table it is clearly shows that the MSE of projected work is better than other existing algorithm.

Conclusion

There are different types of tumors are available. They may be as mass in brain or malignant over the brain. Suppose if it is a mass then modified fuzzy C-means algorithm with morphological operation is enough to extract accurate tumor brain cells. If there is any noise are present in the MR image it is removed before the proposed process. The noise free image is given as an input to the proposed method to tumor is extracted from the MRI image. The experimental results are compared with other algorithms. The stage of tumor is based on the area of tumor.

References

- J. Selvakumar, A.Lakshmi, T.Arivoli, "Brain Tumor Segmentation and Its Area Calculation in Brain MR Images using K-Mean Clustering and Fuzzy C-Mean Algorithm", IEEE-International Conference On Advances In Engineering, Science And Management (ICAESM -2012) 2012, pp-186-190
- [2] Phooi Yee Lau, Frank C. T. Voon, and Shinji Ozawa," The detection and visualization of brain tumors on T2weighted MRI images using multi-parameter feature blocks", Proceedings of the 2005 IEEE Engineering in Medicine and Biology 27th Annual Conference Shanghai, China 2005, pp-5104-5107
- [3] Dipali M. Joshi, Dr. N. K. Rana and V. M. Mishra, "Classification of Brain Cancer Using Artificial Neural Network", International Conference on Electronic Computer Technology 2010, pp-112-116
- [4] Carlos Arizmendi, Juan Hernández-Tamames, Enrique Romero, Alfredo Vellido, Francisco del Pozo, "Diagnosis of Brain Tumors from Magnetic Resonance Spectroscopy using Wavelets and Neural Networks", Annual International Conference of the IEEE EMBS 2010, pp-6074-6077
- [5] Arpita Das, Mahua Bhattacharya, "A Study on Prognosis of Brain Tumors Using Fuzzy Logic and Genetic Algorithm Based Techniques", International Joint Conference on Bioinformatics, Systems Biology and Intelligent Computing 2009, pp-348-351
- [6] Ahmed Kharrat, Mohamed Ben Messaoud, "Detection of Brain Tumor in Medical Images", International Conference on Signals, Circuits and Systems 2009, pp-1-6
- [7] ason J. Corso, Eitan Sharon, ShishirDube, Usha Sinha, and Alan Yuille, "Efficient Multilevel Brain Tumor Segmentation With Integrated Bayesian Model Classification", IEEE TRANSACTIONS ON MEDICAL IMAGING, VOL. 27, NO. 5, MAY 2008, pp-629-640
- [8] RoopaliR.Laddha, S.A.Ladhake,"A Review on Brain Tumor Detection Using Segmentation And Threshold Operations" International Journal of Computer Science and Information Technologies, Vol. 5. 2014, pp-607-611

- [9] Abramov A., Kulvicius T., Wörgötter F., and Dellen B. Real-time image segmentation on the gpu. Conference for Young Scientists on Facing the Multicore Challenge, pages 1–13, 2010.
- [10] Xu C. and Prince J.L. Gradient vector flow: A new external force for snakes. In IEEE Conference on Computor Vision and Pattern Recognition, pages 66–71, Los Alamitos, 1997.
- [11] Grady L. Random walks for image segmentation. IEEE Transactions on Pattern Analysis and Machine Intelligence, 28(11):1768–1783, 2006.
- [12] Qi Y., Xiong W., Leow W.K., Tian Q., Zhou J., Liu J., Han T., Venkatesh S.K., and Wang S. Semi-automatic segmentation of liver tumors from CT scans using Bayesian rule-based 3d region growing [cited May 10 2011]. In Proceedings of MICCAI workshop of 3D segmentation in the clinic: a grand challenge II, New York, 2008.
- [13] SonaliJavare, Vijay Patil, NitinPatil, "Brain MR Image Segmentation Technique: A Review", Transactions on Engineering and Sciences, Vol.2, Issue 12, December 2014.
- [14] SonaliJavare, NitinPatil, Sanjay Patil, "Brain Tumor Segmentation and Area Calculation of Tumor by Use of Unsupervised Clustering Algorithm", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 4, Issue 11, November 2014

Analysis of Image Compression Algorithm Using Block Truncation Coding With Modified Quantization for Gray Scale Image

Rahul Sharma¹, Dr. Prashant Mor²

#1PhD Scholor, Department of Electronics Science, Rani Durgawati University, Jabalpur
#2, Professor Department of Electronics Science, Rani Durgawati University, Jabalpur
1 rahulsharma1247@gmail.com
2 morprashant2012@gmail.com

Abstract

In the present era of communication system, the requirement of image storage and transmission for image processing are increasing exponentially. This is why; the need for better compression technology is in extremely demands. In this paper, a gray image compression method using modified quantization scheme is proposed. This method having the advantages of BTC and quantization both. The BTC algorithm with quantization has some controlling parameters through which we can control the quality and compression of the image. The performance of the proposed method has been evaluated in terms of Entropy, PSNR, MSE & SSIM. The result of the proposed work is better than the previous work of literature.

Keywords— BTC, Compression, quantization, algorithm, image retrieval, multimedia.

1. BLOCK TRUNCATION CODING

Block truncation coding is one of the lossy coding techniques applicable for Gray scale images. It reduces the file size but loses some extent of original information of the image [9]. The significant advantages of this coding approach are low computational complexity and high parallelism.

The basic idea of BTC is to perform moment preserving quantization for blocks of pixels. The input image is divided into non-overlapping blocks of pixels of sizes 4×4, 8×8 and so on. Mean and standard deviation of the blocks are calculated. Mean is considered as the threshold and reconstruction values are determined using mean and standard deviation. Then a bitmap of the block is derived based on the value of the threshold which is the compressed or encoded image. Using the reconstruction values and the bitmap the reconstructed image is generated by the decoder. Thus in the encoding process, BTC produces a bitmap, mean and standard deviation for each block. It gives a compression ratio of 4 and bit rate of 2 bits per pixel when a 4×4 block is considered. This method provides a good compression without much degradation on the reconstructed image. But it shows some artifacts like staircase effects or raggedness near the edges. Due to its simplicity and easy implementation, BTC has gained big interest in its further improvement and application for image compression.

The algorithm for BTC is as follows:

Step 1: Input a gray scale image of size M×N pixels and the dimension of the square block k by which the image is to be divided into non-overlapping blocks.

Step 2: Divide the image into various blocks, each of size kxk, value of k can be 4, 8, 16, and so on. Each block, W is represented as;

$$W = \begin{bmatrix} w_1 & \cdots & w_k \\ \vdots & \ddots & \vdots \\ w_1^2 & \cdots & w_k^2 \end{bmatrix}$$

Step 3: calculate the mean and variance of gray level in block W

$$\mu = \frac{1}{p} \sum_{i=1}^{p} w_i \tag{1}$$

$$m_1 = \frac{1}{k} \sum_{i=1}^{k} f(x_i)$$
 (2)

$$m_2 = \frac{1}{k} \sum_{i=1}^{k} f(x_i)^2$$
 (3)

 m_1 is the sample mean and the sample variance σ^2 of image block is given by:

$$\sigma^2 = m_2 - m_1 \tag{4}$$

Step 3: Now the compressed bit map is obtained by

$$B = \begin{cases} 1, w_i > \mu \\ 0, w_i \le \mu \end{cases}$$
(5)

Step 4: The bit map B, μ and ι are transmitted to the decoder.

The algorithm for decoder is as follows:

Step 1: Calculate a & b

$$a = \mu + \sigma \sqrt{\frac{p}{q}}$$
(6)
$$b = \mu - \sigma \sqrt{\frac{q}{p}}$$
(7)

where p = No. of 0's in the bit map and q = No. of 1's in the bit map

Step 2: The reconstructed image Z can be obtained by replacing the element 1 in B with H and element 0 with L.



Figure 1: Block diagram of Block Truncation Coding

2. PROPOSED WORK

In this proposed work lossy image compression has been implemented. For the implementation of Lossy image compression Block Truncation coding with region based segmentation has been applied. In the first stage image of size 256×256 has been segmented on the basis of region. Then a block of size $n\times n$ (where n=4, 8 or 16) has been chosen. We obtain the minimum, maximum and mean value of pixel of that block. On the basis of threshold based on above parameter we evaluate a bit map for the particular block. The process is applied on every block of the image. Thus obtained bit pattern or logic matrix with parameters is send to the decoder end. On the decoder end the image is decompressed on the basis of transmitted bit map information.

Step 1: Input a gray scale or color image of size 256×256 pixels and the dimension of the square block k by which the image is to be divided into non-overlapping blocks

Step 2: image is segmented into different region using region based segmentation method.

Step 3: Divide the image into various blocks, each of size k×k, value of k can be 4, 8, 16, and so on. If image is overlapping corresponding to the block, there is zero padding.

Step 4: find minimum value of the pixel, maximum value of the pixel & mean value of the pixel. Evaluate the Threshold using below formula for each region

Threshold = $\frac{\max. \text{ pixel value + min. pixel value + mean}}{2}$. (8)

Step 5: Now the compressed bit map for each region is calculated by

$$B = \begin{bmatrix} b_1 & \cdots & b_k \\ \vdots & \ddots & \vdots \\ b_1^2 & \cdots & b_k^2 \end{bmatrix}$$

Where, $\mathbf{b}_{j} = \begin{cases} 1, w_{i} > T \\ 0, w_{i} \leq T \end{cases}$

Step 6: The bit map B, minimum value of the pixel, maximum value of the pixel & mean value is sent to the decoder.

Step 7: Pixels in the image block W are then classified into two ranges of values. The upper range is those Gray levels which are greater than T and lower range is those which are less than or equal to T. The mean of higher range ($\mu_{\rm H}$) and the lower range ($\mu_{\rm L}$) are calculated using (9) and (10) respectively. Then these two values are used for reconstruction of the image.

$$\mu_{\rm H} = \frac{1}{p} \sum_{i=1}^{p} w_i, w_i > T$$
(9)

$$\mu_{\rm L} = \frac{1}{q} \sum_{i=1}^{q} w_i, w_i \le T$$
(10)

Where p is the number of Gray value greater than T and q is the number of Gray value less than T.

Step 8: Decode bitmap block B with the reconstruction values μ_H and the lower range μ_L in such a way that the elements assigned 0 are replaced with μ_L and elements assigned 1 are replaced with μ_H .

Then the decoded image block Z can be represented as,

$$\mathbf{Z} = \begin{bmatrix} \mathbf{z}_1 & \cdots & \mathbf{z}_k \\ \vdots & \ddots & \vdots \\ \mathbf{z}_1^2 & \cdots & \mathbf{z}_k^2 \end{bmatrix}$$

Where, $z_i = \begin{cases} \mu_L, b_j = 0 \\ \mu_L, b_j = 1 \end{cases}$

3. SIMULATION RESULT

This paper has been implemented on the basis of above discussed algorithm using MATLAB simulator. First of all the work has been simulated on 4x4 block size then 8x8 and 16x16 block size for different input and reference images. Region based segmentation provides better quality in terms of MSE, PSNR and SSIM, which has been evaluated on the simulator. Finally the result has been compared with different existing method in the literature.

Simulation of Block truncation coding with modified quantization for 4×4 block size



Figure 1: Lena Input image (a) gray scale image (b) logical matrix image (c) compressed image



Figure 2: Baboon Image (a) Gray scale image (b) logical matrix image (c) compressed image



Figure 3: Flower Image (a) Gray scale image (b) logical matrix image (c) compressed image



Figure 4: Fort Input image (a) gray scale image (b) logical matrix image (c) compressed image



Figure 5: Fall Input image (a) gray scale image (b) logical matrix image (c) compressed image

RESULT ANALYSIS FOR 4*4 Block Size

Image	Entropy of Original Image	Entropy of Compressed Image	MSE	PSNR	SSIM
Lena Image	7.4543	7.3982	16.0643	81.8468	0.9965
Baboon Image	7.2193	7.1572	32.2887	72.9427	0.9952
Flower Image	7.2978	7.2722	6.5197	90.4435	0.9989
Fort Image	7.5246	7.4951	19.1468	80.7472	0.9967
Fall Image	7.3815	7.3488	20.4254	79.5282	0.9973

Table 1: Performance in terms of MSE, PSNR, ENTROPY & SSIM for different image



Figure 5.6: Graph depicting ENTROPY for different image of 4 ×4 block size



Figure 5.7: Graph depicting MSE for different image of 4 ×4 block size



Figure 5.8: Graph depicting PSNR for different image of 4 ×4 block size



Figure 5.9: Graph depicting SSIM for different image of 4 ×4 block size

Simulation of Block truncation coding with modified quantization for 8×8 block size







Figure 11: Baboon Input image (a) gray scale image (b) logical matrix image (c) compressed image



Figure 12: Flower Input image (a) gray scale image (b) logical matrix image (c) compressed image



Figure 13: Fort Input image (a) gray scale image (b) logical matrix image (c) compressed image



Figure 14: Fall Input image (a) gray scale image (b) logical matrix image (c) compressed image

RESULT ANALYSIS FOR 8×8 Block Size

Image	Entro py of Origi nal Imag e	Entropy of Compre ssed Image	MSE	PSN R	SSI M
Lena	7.45	7.2804	26.5	76.8	0.99
Image	43		617	181	33
Baboo n Image	7.21 93	7.0802	44.0 471	69.8 373	0.99 25
Flower	7.29	7.2074	11.8	84.4	0.99
Image	78		553	639	74
Fort	7.52	7.4155	29.3	76.4	0.99
Image	46		857	635	37
Fall	7.38	7.2667	32.5	74.8	0.99
Image	15		785	594	48

Table 2: Performance in terms of MSE, PSNR, ENTROPY & SSIM for different image



Figure 5.15: Graph depicting ENTROPY for different image of 8 x8 block size



Figure 5.16: Graph depicting MSE for different image of 8 x8 block size



Figure 5.17: Graph depicting PSNR for different image of 8 ×8 block size



Figure 5.18: Graph depicting SSIM for different image of 8 x8 block size

Simulation of Block truncation coding with modified quantization for 16×16 block size



Figure 19: Lena Input image (a) gray scale image (b) logical matrix image (c) compressed image



Figure 20: Baboon Input image (a) gray scale image (b) logical matrix image (c) compressed image



Figure 21: Flower Input image (a) gray scale image (b) logical matrix image (c) compressed image



Figure 22: Fort Input image (a) gray scale image (b) logical matrix image (c) compressed image



Figure 23: Fall Input image (a) gray scale image (b) logical matrix image (c) compressed image

RESULT ANALYSIS FOR 16×16 Block Size

Image	Entropy of Original Image	Entropy of Compressed Image	MSE	PSNR	SSIM
Lena Image	7.4543	7.0336	38.4451	73.1205	0.9897
Baboon Image	7.2193	6.8710	53.3275	67.9254	0.9901
Flower Image	7.2978	6.9816	19.4488	79.5139	0.9959
Fort Image	7.5246	7.1854	36.5177	74.2906	0.9912
Fall Image	7.3815	7.2667	32.5785	74.8594	0.9948

Table 3: Performance in terms of MSE, PSNR, ENTROPY & SSIM for different image



Figure 5.24: Graph depicting SSIM for different image of 16 ×16 block size



Figure 5.25: Graph depicting MSE for different image of 16 ×16 block size



Figure 5.26: Graph depicting PSNR for different image of 16 ×16 block size



Figure 5.27: Graph depicting SSIM for different image of 16 ×16 block size

4. Conclusion

In this paper lossy image compression using Block Truncation Coding with modified quantization has been performed using MATLAB simulator. Different block size taken for the implementation like 4×4, 8×8 & 16×16 and the image size is 256 ×256. The performance analysis has been carried out using MSE, PSNR & SSIM for different real and reference images. Result shows better improvement over the existing methodology.

References

[1] D. Salomon, "Data Compression: The Complete Reference". Springer-Verlag, New York, 2000.

[2] D. Huffman, "A method for the construction of minimum redundancy codes". Proceeding of the IRE, 40:1098 – 1101, 1952.

[3] R. C. Gonzalez and R. E. Woods, "Digital Image Processing", Prentice Hall, 2002.

[4] D. Tabuman and M. W. Marcelin, "JPEG 2000: image compression fundamentals, standards and practices", Kluwer Academic Publishers, 2001.

[5] A. E. Jacquin, "Image coding based on a fractal theory of iterated contractive image transformations". IEEE Transactions on Image Processing, 1:18 – 30, 1992.

[6] G. E. Oien and S. Lepsoy, "Fractal-based image coding with fast decoder convergence". Signal Processing, 40:105 – 117, 1994.

[7] L. Thomas and F. Deravi, "Region-based fractal image compression using heuristic search". IEEE Transactions on Image Processing, 4:832 – 838, 1995.

[8] Z. Wang and A. C. Bovik, "A universal image quality index". IEEE Signal Processing Letters, 9:81 – 84, 2002.

[9] Z. Wang, A. C. Bovik, and L Lu, "Why is image quality assessment so difficult?" In Proc. of the IEEE international conference on Acoustic, Speech, and Signal Processing, pages 3313 – 3316, 2002.

[10] Z. Wang, A. C. Bovik, H. R. Sheikh, and E. P. Simoncelli. "Image quality assessment: From error visibility to structural similarity". IEEE Transactions on Image Processing, 13:600 – 612, 2004.

[11] E. J. Delp and O. R. Mitchell, "Image compression using block truncation coding". IEEE Transactions on Communications, 27:1335 – 1342, 1979.

[12] J. A. Storer and H. Helfgott, Lossless image compression by block matching. The Computer Journal, 40:137 – 145, 1997.

[13] G. Langdon and J. Rissanen, Compression of black white images with arithmetic coding. IEEE Transactions on Communications, 29:858 – 867, 1981.

[14] A. Moff at. Two-level context based compression of binary images. In Proc. Of the Data Compression, pages 382 – 391. IEEE Computer Society Press, 1991.

[15] Jing-Ming Guo & Yun-Fu Liu, "Improved Block Truncation Coding Using Optimized Dot Diffusion", IEEE TRANSACTIONS ON IMAGE PROCESSING, VOL. 23, NO. 3, MARCH 2014

[16] Jayamol Mathews, Madhu S. Nair & Liza Jo, "Modified BTC Algorithm for Gray Scale Images using max-min Quantizer", IEEE 2013.

[17] Ki-Won Oh & Kang-Sun Choi, "Parallel Implementation of Hybrid Vector Quantizer based Block Truncation Coding for Mobile Display Stream Compression", IEEE ISCE 2014.

[18] Jing-Ming Guo, Heri Prasetyo, and Jen-Ho Chen, "Content-Based Image Retrieval Using Error Diffusion Block Truncation Coding Features", IEEE Transactions on Circuits and Systems for Video Technolo "Content-Based Image Retrieval Using Features Extracted From Halftoning-Based Block Truncation Coding", 2014.

[19] Seddeq E. Ghrare & Ahmed R. Khobaiz, "Digital Image Compression using Block Truncation Coding and Walsh Hadamard Transform Hybrid Technique", IEEE conference 2014.

[20] Jing-Ming Guo, Heri Prasetyo & Jen-Ho Chen "Content-Based Image Retrieval Using Error Diffusion Block Truncation Coding Features", IEEE Transactions on image processing, vol. 24, no.3, march 2015.

Lossy Image Compression Technique Using BTC with Region Based Segmentation for Gray Scale Image

Rahul Sharma¹, Ajeet Shrivastava², Dr. Prashant Mor³

1PhD Scholor, Department of Electronics Science, Rani Durgawati University, Jabalpur

2PhD Scholor, Department of Electronics Science, Rani Durgawati University, Jabalpur

3, Professor Department of Electronics Science, Rani Durgawati University, Jabalpur

1 rahulsharma1247@gmail.com ajeetkumar9@rediffmail.com 2 morprashant2012@gmail.com

Abstract

In the present era of communication system, the requirement of image storage and transmission for image processing are increasing exponentially. This is why; the need for better compression technology in extremely demands. In this paper, a gray image compression method (Optimized BTC algorithm using vector quantization) is proposed. This method having the advantages of BTC and vector quantization both. The BTC algorithm with vector quantization has some controlling parameters through which we can control the quality and bit-rate. The performance of the proposed method has been evaluated in terms of PSNR, MSE & SSIM. The result of the proposed schemes is established by comparing the performance with that of the existing methods. Keywords

BTC, Compression, quantization, algorithm, image retrieval, multimedia.

1. INTRODUCTION

20th century is information driven society where information's are generated, manipulated and transmitted over the distances by means of some media. The amount of this digital information is huge and a need of large amount of storage space is required. The transmission of such information through limited bandwidth channel is very time consuming. With the use of internet the data transmitted are huge in amount which consumes more bandwidth. Now a day's these data are increasing rapidly and most of the data are image. The usefulness of digital images in communicating information is well appreciated. But the cost of storage and transmission of data is very expensive. Hence the need of image compression technique is much more in demand.

An image compression method represents an image in a more compact way. The compression techniques increase the effective volume of storage space allowing more data to be stored in the storage device. In addition, the compression methods increase the bandwidth of the transmission medium and higher volume of data can be transmitted over the same transmission channel. Thus, image compression refers to a process in which the amount of data used to represent an image is reduced to meet the bit-rate requirement (not more than the maximum available bit rate). On the other hand, the quality of the reconstructed image must satisfy the requirement of certain application, and the computational complexity should also be affordable for the application.

The required quality of the reconstructed image is application dependent. For example, in medical

science and some other scientific measurement, the reconstructed image has to be an exact replica of the original image. Only lossless compression methods are used in these application fields. However, in applications like motion pictures, video phony etc. some amount of loss of information is acceptable. This type of compression technique is called lossy compression.

COMPRESSION TECHNIQUES

Different types of redundancies in image information are used to help to compress them. There are two categories in which compression technique exists: one is transform domain methods and second is spatial domain methods. Compression techniques may also be classified as lossy/lossless.

2.1 Transform Domain Methods

The performance of transform domain methods is superior to that of spatial domain methods in terms of compression ratio and quality of the restored image. Recent used compression standards like, JPEG (DCT based) [8, 9] and JPEG2000 (wavelet based) [10, 11, 12] are transform based methods. In transform domain methods images are first transformed from spatial domain to frequency domain then quantization od coefficients are carried out by the entropy coding.

In traditional transform coding, Fourier transform or discrete cosine transform are used. The main problem of these transformations is the block size to handle both smooth and active area. The smooth area information is localized in a more compact way in frequency domain; whereas, in the active area it is more localized in spatial domain. So, it is very difficult to obtain a compromise between these using the traditional transformation.

2.2 Spatial Domain Method

The decoding part of Spatial domain compression methods are computationally much less intensive compared to the transform domain methods. Most often used spatial domain image compression techniques are the vector quantization (VQ) [17], block truncation coding (BTC) [18] and 1-D/2-D run length coding [19].

In bit plane method a image is considered as series of binary images and each binary image is compressed with binary compression method. In block match coding method there are two buffers, the search buffer and the look-ahead buffer. Each block in the look-ahead buffer is first matched with all the blocks in the search buffer and then the best matched block is selected for the conclusion. This method is an extension of LZ77 method [28]. The Context-based method compresses an image by scanning it pixel by pixel and examining the context of every pixel then a probability is assigning to it depending on the repetition of context in the past.

2.3 Lossless/ Lossy Compression

Image compression is crucial steps in multimedia applications, and the quality has to be maintained up to a certain satisfactory level. But in some applications like, medical analysis, scientific measurement and legal issues, the reconstructed image has to be an exact replica of the original image. Thus, depending on the requirement, a compression method may be lossy or lossless. All the compression methods are either lossy or lossless based on scheme related to coding. In lossless compression there is a limit beyond which the compression may not be achieved.

In lossy image compression, a direct relation between the amount of compression and the distortion occurred exists. Most often a lossy image compression provides better compression than lossless compression. For example Lempel-Ziv-Welch coding, Contour coding, Huffman coding, Run length coding [32, 33], and arithmetic coding. In Lossy coding methods predictive coding, Vector Quantization (VQ), block truncation coding, transform based coding (JPEG and

ISSN No.2278-8050

JPEG2000) and fractal based coding occurs.

2.4 Objective quality Measurement

The goal of objective quality assessment research is to suggest quality metrics that can quantify the quality of image automatically. Objective quality assessment techniques in literature are mainly error-based methods. It uses pixel based difference metrics for example MSE, RMSE, mean absolute error (MAE), signal to noise ratio, and peak signal to noise ratio (PSNR). Let $f(x, y)_{M \times N}$ and $g(x, y)_{M \times N}$ be the original and reconstructed images, respectively. The MSE between f and g is defined as:

 $MSE = \frac{1}{MN} \sum_{x=1}^{M} \sum_{y=1}^{N} \{f(x, y) - g(x, y)\}^{2} \quad (1)$

For 8-bit gray scale image PSNR is defined as

 $PSNR = 10\log_{10} \frac{255^2}{MSE} dB$ (2)

SSIM: The Structural Similarity (SSIM) index is used to measure the similarity between two images. It can be treat as a quality measure of a images with respect to the compared image. It is a full reference metric; it means, the measurement or probability of image quality is based on an initial uncompressed or distortion-free image as reference.

It is designed to improve on conventional methods such as peak signal-to-noise ratio (PSNR) and mean squared error (MSE), which is often seen as inconsistent with human visual perception. It is evaluated on various windows of an image. The measure between two windows x and y of common size N×N is:

SSIM (x,y) =
$$\frac{(2\mu_x\mu_y + c_1)(2\sigma_{xy} + c_2)}{(\mu_x^2 + \mu_y^2 + C_1)(\sigma_x^2 + \sigma_y^2 + C_2)}$$
 (3)

Where,

 μ_x is the average of x; μ_y is the average of y; $\sigma_x{}^2$ is the variance of x; $\sigma_y{}^2$ is the variance of y; σ_{xy} is the covariance of x and y; $c1 = (k_1L)^2$, $c2 = (k_2L)^2$ two variables to stabilize the division with weak denominator; L the dynamic range of the pixel-values (typically this is $2^{\#\,bits\,\,per\,\,pixel}\,-1$); $k_1 = 0.01$ and $k_2 = 0.03$ by default.

2. PROPOSED WORK

In this proposed work lossy image compression has been implemented. For the implementation of Lossy image compression Block Truncation coding with vector quantization has been applied. In the first stage image of size 256×256 has been segmented on the basis of region. Then a block of size $n \times n$ (where n = 4, 8 or 16) has been chosen. We obtain the minimum, maximum and mean value of pixel of that block.

On the basis of threshold based on above parameter we evaluate a bit map for the particular block. The process is applied on every block of the image. Thus obtained bit pattern or logic matrix with parameters is send to the decoder end. On the decoder end the image decompressed based on the information of bit map and parameters.

Threshold = minimum + maximum + mean . (4)

3. SIMULATION RESULT

This paper has been implemented on the basis of above discussed algorithm using MATLAB simulator. First of all the work has been simulated on 4×4 block size then 8×8 and 16×16 block size for different input and reference images. Region based segmentation provides better quality in terms of MSE, PSNR and SSIM, which has been evaluated on the simulator. Finally the result has been compared with different existing method in the literature.



Figure 1: Flow chart of Proposed Algorithm Simulation of Block truncation coding with vector Quantization for 4×4 block size



Figure 2: Lena Input image (a) colour image (b) gray scale image (c) logical matrix image (d) compressed image



Figure 3: Baboon Image (a) Colour Image of 256×256 size (b) Gray scale image (c) logical matrix image (d) compressed image





Figure 5: class Input image (a) colour image (b) gray scale image (c) logical matrix image (d) compressed image



Figure 6: Real image Input image (a) colour image

(b) gray scale image (c) logical matrix image (d) compressed image

RESULT ANALYSIS FOR 4*4 Block Size

Image	MSE	PSNR	SSIM
Lena Image	16.0643	81.8468	0.9965
Baboon Image	32.2887	72.9427	0.9952
Dogs Image	11.8869		0.9971
		86.0709	
Class	23.4409	78.2339	0.9922
Image			
Real Image	16.8051	82.6084	0.9947

Table 1: Performance in terms of MSE, PSNR & SSIM for different image



Figure 7: Graph for MSE, PSNR & SSIM for different image of 4 ×4 block size

Simulation of Block truncation coding with vector Quantization for 8x8 block size



Figure 8: Lena Input image (a) colour image (b) gray scale image (c) logical matrix image (d) compressed image



Figure 9: Baboon Input image (a) colour image (b) gray scale image (c) logical matrix image (d) compressed image



Figure 10: Dogs Input image (a) gray scale image (b) logical matrix image (c) compressed image



Figure 11: Class Input image (a) colour image (b) gray scale image (c) logical matrix image (d) compressed image



Figure 12: Real image Input image (a) colour image (b) gray scale image (c) logical matrix image (d) compressed image

RESULT ANALYSIS FOR 8*8 Block Size

Image	MSE	PSNR	SSIM
Lena	26.5617	76.8181	0.9933
Image			
Baboon	44.0471	69.8373	0.9925
Image			
Dogs	20.8525	80.4505	0.9933
Image			
Class	19.8806	80.8493	0.9929
Image			

Real	28.2186	77.4255	0.9895
Image			

Table 2: Performance in terms of MSE, PSNR & SSIM for different image



Figure 13: Graph for MSE, PSNR & SSIM for different image of 8 x8 block size

Simulation of Block truncation coding with vector Quantization for 16×16 block size



Figure 14: Lena Input image (a) colour image (b) gray scale image (c) logical matrix image (d) compressed image



Figure 15: Baboon Input image (a) colour image (b) gray scale image (c) logical matrix image (d) compressed image



Figure 16: Dogs Input image (a) gray scale image (b) logical matrix image (c) compressed image



Figure 17: class Input image (a) colour image (b) gray scale image (c) logical matrix image (d) compressed image



Figure 18: real image Input image (a) colour image (b) gray scale image (c) logical matrix image (d) compressed image

RESULT ANALYSIS FOR 16*16 Block Size

Image	MSE	PSNR	SSIM
Lena Image	38.4451	73.1205	0.9897
Baboon	53.3275	67.9254	0.9901
Image			
Dogs Image	33.9615	75.5730	0.9860
Class	38.7285	73.2130	0.9793
Image			
Real Image	37.8205	74.4968	0.9847

Table 3: Performance in terms of MSE, PSNR & SSIM for different image



Figure 19: Graph for MSE, PSNR & SSIM for different image of 16 ×16 block size

		DOND	
Methods	INISE	PSINK	2211/1
EDBTC_F [10]		34.38	0.940
			9
EDBTC_J [11]		30.64	0.931
			8
DDBTC [12]		34.44	0.945
			1
MBTC [13]		28.001	0.855
		1	4
BTC and Walsh	119.	25.31	
Hadamard	24		
Transform			
Hybrid			
Technique [14]			
Proposed	26.5	76.818	0.993
Method	617	1	3

Table 4: Comparison table with the methods in literature (For BLOCK 8x8 Size)

4. CONCLUSION

In this paper Block Truncation coding with vector quantization has been implemented using MATLAB Simulator for different block size. Performance evaluation parameter like MSE, PSNR & SSIM has been evaluated for different real and reference images. Result has been compared with existing methods in the literature which shows better performance for real images. Region based segmentation shows enhanced performance than the traditional method.

References

[1] E. J. Delp and O. R. Mitchell, "Image compression using block truncation coding," IEEE Trans. Commun., vol. 27, no. 9, pp. 1335–1342, Sep. 1979.

[2] D. Salomon, Data Compression: The Complete Reference. Springer-Verlag, New York, 2000.

[3] Y. Q. Shi and H. Sun, Image and video compression for multimedia engineering: fundamentals, algorithms, and standards. CRC Press, USA, 1999.

[4] D. Huffman, A method for the construction of minimum redundancy codes. Proceeding of the IRE, 40:1098 – 1101, 1952.

[5] I. H. Witten, M. N. Radford, and J. G. Cleary, Arithmetic coding for data compression. Communications of ACM, 60:520 – 540, 1987.

[6] W. Pratt, Digital Image Processing, John Wiley and Sons, New York, 1978.

[7] K. R. Rao and P. C. Yip Eds, the Transform and Data Compression Handbook. CRC Press, Boca Raton, FL, 2001. [8]S. Dunn. Digital color image processing using MATLAB. http://davis.wpi.edu/~matt/courses/color.

[8]5. Dunn. Digital color image processing using MATLAB. http://davis.wpi.edu/~mati/course

[9] R. C. Gonzalez and R. E. Woods, Digital Image Processing, Prentice Hall, 2002.

[10] V. Ostromoukhov, "A simple and efficient error-diffusion algorithm," in Proc. 28th Annu. Conf. Comput. Graph., 2001, pp. 567–572.

[11] P. Li and J. P. Allebach, "Tone-dependent error diffusion," IEEE Trans. Image Process., vol. 13, no. 2, pp. 201–215, Feb. 2004.

[12] Jing-Ming Guo and Yun-Fu Liu, "Improved Block Truncation Coding Using Optimized Dot Diffusion", IEEE Transactions on image processing, vol. 23, no. 3, March 2014

[13] Jayamol Mathews, Madhu S. Nair, Liza Jo, "Modified BTC Algorithm for Gray Scale Images using max-min Quantizer", IEEE, 2013

[14] Seddeq E. Ghrare , Ahmed R. Khobaiz, "Digital Image Compression using Block Truncation Coding and Walsh Hadamard Transform Hybrid Technique", IEEE, 2014.

[15] T. Ebrahimi, C. A. Christopoulos, and D. T. Lee, Special issue introduction, jpeg2000. Signal Processing: Image Communication, 17:1–144, 2002.

[16] J. M. Shapiro, Embedded image coding using zerotrees of wavelet coefficients. IEEE Transactions on Signal Processing, 41:3445 – 3462, 1993.

[17] A. Said and W. A. Pearlman. A new, fast, and efficient image codec based on set partitioning in hierarchical trees. IEEE Transactions on Circuits and System for Video Techniques, 6:243–250, 1996.

[18] D. Marpe and H. L. Cycon, Very low bit rate video coding using wavelet-based techniques, IEEE Transactions on Circuits and Systems for Video Technology, 9:85 – 94, 1999.

[19] D. Gleich, P. Planinsic, and Z. Cucej, Low bitrate video coding using wavelet transform, In Proc. of the EURASIP conference on Video/Image Processing and Multimedia Communications, pages 369 – 374, 2003.

[20] R. Leonardi and J. R. Ohm, Wavelet video coding - an overview (iso/iec jtc1/sc29/wg11 w7824). 2006.

[21] R. B. Arps, Binary image compression. In Image Transmission Techniques, pages 219 – 276. Academic Press, W. K. Pratt (Ed.), New York, 1979.

[22] H. Samet, Application of spatial data structures: Computer Graphics, Image

Processing and GIS. Addison Wesley, Reading , MA, 1990.

A Medical Diagnosis using Artificial Immune Recognition system

Priyanka Thakur¹, Bhupendra Malviya²RahulGupta³

Assistant Professor, SORT, PU, Bhopal <u>priyankathakur653@gmail.com</u>,
 Assistant Professor, SORT, PU, Bhopa bhupendra09sm@gmail.com
 3 Rsearch Scholar, SORT, PU, Bhopal, rk13259@gmail.com

Abstract

The research in the medical domain is clinical in its nature but with the advancement of information technology the trends of researchers in health care sector has been moving towards medical informatics. Usage of Artificial Immune System techniques plays a major role in medical informatics. Especially when it comes to predicting or forecasting the survivability of a disease which is known as medical prognosis, data mining plays a major role. AIS algorithms are machine - learning algorithms that typically exploit the immune system's characteristics of learning and memory to solve complex problem. It attempts to take advantages and benefits of natural immune systems for use in tackling complex problem domains. It is a class of adaptive or learning computer algorithm inspired by function of the biological immune system, designed for and applied to difficult problems such as intrusion detection, data clustering, and classification and search problems. In this paper, a study of artificial immune systems algorithms like ClonALG Selection Algorithm are presented with the possible number of applications in various domain **Keywords:** AIS, ClonALG Algorithm, Medical Dianosis

1. Introduction

Artificial Immune System provide a powerful tool to help doctors to analyze, model and make sense of complex clinical data across a broad range of medical applications. Most applications of artificial neural networks to medicine are classification problems; that is, the task is on the basis of the measured features to assign the patient to one of a small set of classes [1]. Medical diagnosis always has been an art: we remember famous doctors as well as famous painters or composers throughout the history. Again, who is called an artist? A person who can carry out something those others cannot, and that is exactly what a good physician does during a medical diagnosis procedure. He (or she) employs his educations, experiences, and talent, to diagnose a disease. A diagnosis procedure usually starts with the patient complaints and the doctor learn more about the patient situation interactively during an interview, as well as by measuring some metrics such as blood pressure or the body temperature. The diagnosis is then determined by taking the whole available patients status into the account. Then depending on that, a suitable treatment is prescribed, and the whole process might be iterated. In each iteration, the diagnosis might be reconfigured, refined, or even rejected [6].

The major task of medical science is to prevent and diagnose the diseases. Below some certain difficulties of medical diagnosis that have to be taken into account are listed: The basis for a valid

diagnosis, a sufficient number of experienced cases, is reached only in the middle of a physician's career and is therefore not yet present at the end of the academic formation.

- This is especially true for rare or new diseases where also experienced physicians are in the same situation as newcomers.
- Principally, humans do not resemble statistic computers but pattern recognition systems. Humans can recognize patterns or objects very easily but fail when probabilities have to be assigned to observations.
- The quality of diagnosis is totally depends on the physician talent as well as his/her experiences.
- Emotional problems and fatigue degrade the doctor's performance.
- The training procedure of doctors, in particular specialists, is a lengthily and expensive one. So even in developed countries we may feel the lack of MDs.
- Medical science is one of the most rapidly growing and changing fields of science. New results disqualify the older treats, new cures and new drugs are introduced day by day.

Even unknown diseases turn up every now and then. So a physician should always try hard to keep his/ herself up to date. Question would be how computers can help in medical diagnosis. Since decades ago, computers have been employed widely in the medical sector. From local and global patient and medicine databases to emergency networks, or as digital archives, computers have served well in the medical sector. Meanwhile, in the case of medical diagnosis, regarding the complexity of the task, it has not been realistic yet to expect a fully automatic, computer-based, medical diagnosis system. However, recent advances in the field of intelligent systems are going to materialize a wider usage of computers, armed with AIS techniques, in that application. A computer system never gets tired or bored, can be updated easily in a matter of seconds, and is rather cheap and can be easily distributed. Again, a good percentage of visitors of a clinic are not sick or at least their problem is not serious, if an intelligent diagnosis system can refine that percentage, it will set the doctors free to focus on nuclear and more serious cases

1.1 How to Use Ann In Medicine

Artificial Immune System could be used in every situation in which exists a relationship between some variables that can be considered inputs and other variables that can be predicted (outputs). The most important advantages using artificial neural networks are that this kind of system solves problems that are too complex for conventional technologies, do not have an algorithmic solution or the solution is too complex to be used. These characteristics have often appeared in medicine. Artificial Immune System has been successfully applied on various areas of medicine, such as: diagnostic systems, biomedical analysis, image analysis, drug development. Using artificial neural networks, it can be monitored a lot of health indices (respiration rate, blood pressure, glucose level) or can be predicted the patient response to a therapy. Artificial neural networks have a very important role in image analysis, too, being used together with processing of digital image in recognition and classification. They are used in pattern recognition because of their capacity to learn and to store knowledge. The medical image field is very important because it offers a lot of useful information for diagnosis and therapy. There are also a lot of applications that use neural

networks connected with Bayesian statistics (which can estimate the probability density of model parameters given the available data)

1.2 Advantage

We can say that Artificial Immune System [7] approaches differ from traditional statistical techniques in many ways and the differences can be exploited by the application developer. They are powerful alternative tools and a complement to statistical techniques when data are multivariate with a high degree of interdependence between factors, when the data are noisy or incomplete, or when many hypotheses are to be pursued and high computational rates are required. With their unique features, both methods together can lead to a powerful decision-making tool. Studies and investigations are being made to enhance the applications of AIS and to achieve the benefits of this new technology. Most frequently quoted advantages of the application of neural networks are:

- Artificial Immune System can provide highly accurate results in comparison with regression models.
- Artificial Immune System are able to learn any complex non-linear mapping / approximate any continuous function and can handle non linearity's implicitly.
- The significance and accuracy of neural network models can be assessed using the traditional statistical measures of mean squared error and R2.
- Artificial Immune System models automatically handle variable interactions if they exist.
- Artificial Immune System as non-parametric methods do not make a prior assumptions about the distribution of the data/input-output mapping function.
- Artificial Immune System is very flexible with respect to incomplete, missing and noisy data/ NNs are fault tolerant.
- Artificial Immune System can be easily updated. It means they are suitable for dynamic environment.
- Artificial Immune System overcomes some limitations of other statistical methods, while generalizing them.

1.3 Applications of Ann's In Medicine

Evaluations of the key prognostic factors in different forms of cancer have shown that we must have more precise therapy guidelines and a more accurate prediction of the patients' outcome. Statistical analysis should be very useful for the clinician, as a tool providing more clarity to the complicated classification systems, risk group categories or therapeutic options. The TNM system is a key tool in oncology, describing the anatomic extent of the different forms of cancer, being helpful to the clinician in the process of therapeutic choice. However, the system has its own limitations: although it has specifications for every organ location, it does not comprise many newer markers or pathological findings, which are necessary for specific diagnosis and therapy. This is the main reason why new prediction instruments are needed, which could adjust to every specific clinical parameter, giving results of great accuracy. ANNs are a possible solution, permitting to discover nonlinear relationships between all the parameters (depending on each other or independent), being superior to the logistic regression, which need supplementary modeling in order to have a comparable flexibility. With the power and speed of the actual

ISSN No.2278-8050

computer hardware and dedicated software, ANNs can easily correlate different prediction factors, find hidden interactions among variables, predict an outcome for a group of patients, stratify patients in risk groups, or approximate a function and complete a known pattern. Other possible (and already verified) applications of the ANNs in medicine include, but are not limited to the diagnosis, imaging, pathology and prognosis evaluation of appendicitis, back pain, dementia, myocardial infarction, arrhythmias, psychiatric disorders, acute pulmonary embolism or sexually transmitted diseases

2. Literature Survey

Rami J.Oweis et al., [2] present the classification of biomedical data using neuro fuzzy approach, where it uses neural network's ability to learn, and membership degrees and functions of fuzzy logic, respectively. A training set is used to create and train the classifier system. The classes are represented as fuzzy sets with degrees of memberships. Each pixel is assigned a degree of membership for each of the three fuzzy subsets. Classified pixels are finally shown as three separate images each representing a set. The method showed high quality classification for images of simple components.

N.Benamrane et al., [3] has proposed an approach for detection and specification of anomalies present in medical images. The idea is to combine three metaphors: Neural Networks, Fuzzy Logic and Genetic Algorithms in a hybrid system. The Neural Networks and Fuzzy Logic metaphors are coupled in one system called Fuzzy Neural Networks. The Genetic Algorithm adds to this hybridizing the property of total research like an initialization of the Fuzzy Neural Networks training algorithm which is based on an adapted version of the back propagation algorithm. After applying the growing region algorithm to extract regions, the Fuzzy Neural Network detects the suspect regions, which are interpreted by the Fuzzy Neural Network of specification.

Ian Middleton et al.,[4] reports on the combined use of a neural network. Chin-Ming Hong et al., (2006) propose a novel neuro fuzzy network which cans efficiently reason fuzzy rules based on training data to solve the medical diagnosis problems. This study proposes a refined K-means clustering algorithm and a gradient-based learning rule to logically determine and adaptively tune the fuzzy membership functions for the employed neuro fuzzy network. In the meanwhile, this study also presents a feature reduction scheme based on the grey-relational analysis to simplify the fuzzy rules obtained from the employed neuro fuzzy network.

S. Shen et al., [5] show the neighborhood attraction based on the traditional fuzzy c-means (FCM) clustering algorithm to improve the segmentation performance. In this algorithm, two factors of neighborhood attraction are considered; one is the feature difference between neighboring pixels in the image, the other is the relative location of neighboring pixels. The problem is formulated as distribution learning and relaxation labeling that may be particularly useful in quantifying and segmenting abnormal brain tissues where the distribution of each tissue type heavily overlaps.

Clarke et al.,[6] has surveyed and presented some segmentation methods that have been proposed in medical image community. The image techniques used for brain segmentation could
be divided in the following groups: threshold-based segmentation, statistical methods for brain segmentation and region growing methods. For all these groups many methods have been proposed in the literature but no one has been widely accepted in order to be used as a general method in clinics. In the category of threshold-based segmentation, use of iterative thresholding, histogram analysis and morphological operations are proposed.

Jaafar and Ali [7] studied diabetes mellitus using Artificial Neural Network with the of determining whether someone is diabetes sufferer or not. A neural network of 8 aim inputs, 5 hidden layers and 1 output layer was used and result indicated high performance of patients diagnosed with diabetes. It analyzed the real procedure of medical diagnosis which usually is employed by physicians and converted to a machine implementable format. Then after selecting some symptoms of 3 different diseases, a data set contains the information of а few hundred cases was configured and applied to Multi layer neural network.

Gupta and Shreevastava [8] highlighted that almost all the physicians are confronted dur ing their formation by the task of learning to diagnose. They Proposed a method for diagnosing diabetes mellitus based on the risk factors. The diagnosis is accomplished using Back Propagation Neural Network Algorithm in NNToo I Box of MATLAB.

Kadhim Qeethara [9] proposed and analysed the Artificial Neural networks in Medical Diagnosis using Back propagation Algorithm. They analyzed the data of hypertension disease using the back propagation algorithm in ANN and resulted in finding out that whether patient is suffering from hypertension or not

K. Anooj [10] has proposed a weighted fuzzy rule based CDSS for the diagnosis of heart disease. It automatically obtains the knowledge from the patient clinical data. The proposed CDSS for risk of heart patients consists of two phases. First is an computerized approach for generation of weighted fuzzy rules and decision tree rules and the second is creating a fuzzy rule based decision support system. The performance of the proposed CDSS improved the risk prediction when compared with the neural network based clinical support system.

Shantakumar B. Patil [11] applied efficient methodology for the extraction of significant patterns from the heart disease warehouses for heart attack prediction. In this firstly the data warehouse is pre- processed in order to make it suitable for the mining process and second ly the K-mean clustering algorithm has been applied for clustering the heart disease warehouse. Hence the recurrent patterns applicable to heart disease are mined with the MAFIA algorithm from the data extracted. In addition, the patterns necessary to heart attack prediction are selected on the basis of computed significant weightage. The neural network is trained with the selected important patterns for the effective prediction of Heart Attack.G. Subbalakshmi, Mr. K. Ramesh and Mr. M. Chinna Rao [12] developed a Decision Support in Heart Disease Prediction System using Naive

Bayes Data Mining technique to discover relations that connects variable in a database. Using medical attributes such as age, sex, blood

sugar and blood pressure it can predict the probability of patients getting heart diseases.

This model could answer complex queries and is resulted out as the most effective model in prediction of heart diseases

Milan Kumari [13] diagnose cardiovascular disease by using different data mining algorithms such as: Support Vector Machine, Artificial Neural Ne twork (ANN), Decision Tree and RIPPER classifier. The authors analyze the performance of these algorithms through several analysis factors such as: Sensitivity, Accuracy, Error Rate, True Positive Rate

S. B. Patel [14]worked to predict the diagnosis of heart disease patients using classification mining techniques. Three classification function techniques in data mining are compared for predicting hear t disease with reduced number of attributes. These are Naïve Bayes, decision tree and classification by clustering. Genetic algorithm are also employed to determine the attributes which contribute more towards the diagnosis of heart ailments which indirect ly reduces the number of tests which are needed to be taken by a patient

Farhad Soleimanian Gharehchopogh et al.[15] performed a case study in diagnosis of thyroid disease using artificial neural network. The importance of using ANNs to diagnose disease is to increase the accuracy of performance. The appropriate selection of ANN architecture affects the network performance effectively to reach the high accuracy. By selecting a hidden layer and log-sigmoid activation function for hidden layer and 6 neurons in the hidden layer, we can reach the classification accuracy for Thyroid disease to 98.6%

Jacqulin Margret et al.[16] proposed the diagnosis of thyroid disease using decision tree splitting rules [3]. Various splitting rule for decision tree attribute selection had been analysed and compared. This helps to diagnosis the thyroid diseases through the extracted rules. From this work, it is clear, that normalized based splitting rules have high accuracy and sensitivity or true positive rate. This work can be extended for medical anv Further enhancement various optimization datasets. can be made using by algorithms or rule extraction algorithms

Osareh, Shadgar, and Markham[17] used an MLP neural network with a genetic-based algorithm for automated identification of exudate pathologies in retinopathy images. An MLP neural network with a fast learning algorithm was used for the prediction of post-dialysis blood urea concentration.

Ma and Wang [18] developed a multilevel feed-forward neural network-based hypertension model for forecasting meteorological factors that could remarkably affect hypertension.

Kondo, Kondo, and Ueno[19] used a group method of data handling (GMDH)-based neural network for three-dimensional analysis of heart images. The GMDH-based network operated

using a heuristic self-organization method. It was applied successfully to liver cancer problems (Kondo, Kondo, Takao, & Ueno, 2010). The algorithm identified characteristics of the cancer images using some feedback-loop calculations.

Walczak[20] deployed the back propagation neural network to predict blood transfusion requirements of trauma patients, in order to enable its efficient utilization in hospitals. While the back propagation algorithm is the most widely used technique for training neural network models, it has some limitations which include the possibility of being trapped in local solutions and producing low classification rates in some cases.

Srinivasan, Eswaran, and Sriraam [21] used the Elman and Probabilistic neural networks for EEG detection. A principal component analysis-enhanced cosine radial basis function neural network classifier was employed for classifi- cation of EEG signals into healthy, ictal, and interictal categories. The SVM for both prediction and detection of Cyclosporine A blood concentrations in therapeutic drug monitoring of kidney recipients was reported in Camps-Vails et al. (2007). It was reported that SVM method would likely to provide poor performance if the number of features was higher than that of the data samples. In addition to producing accurate predictions, rule extraction is another important requirement for intelligent systems to be useful in medical applications. This is because the extracted rules provide domains users with the explanation and justification of predictions.

The decision was interpreted by using a set of association rules. Ribeiro, Traina, Traina, and Azevedo-Marques [22] used the association rulemining technique to examine medical images of mammograms. Based on the analyzed outcomes, suggestions were generated by employing association rules. Time-series data mining pertaining to blood and urine biochemical test data from chronic hepatitis patients was conducted, and knowledge was mined from the data samples.

Jesus, Navío-Acosta, and Jiménez-Trevino [23] used a multi-objective evolutionary algorithm for rule extraction in a study pertaining to different categories of patients visiting the psychiatric emergency department in a given period of time of the day. The extracted rules provided useful information regarding the rate of admission to the psychiatric emergency department. A variety of machine learning and rule extraction methods with respect to medical applications have been reviewed.

Hua Yang et al[24] proposed a framework for the design of AIS based ID Systems (IDSs) to analyze three core aspects such as antibody/antigen encoding, generation algorithm, and evolution mode.

Liang et al.[25] ,proposed a system which applied a combination of two methods of artificial immune and genetic algorithm to diagnose the liver disease. The study represented the immune system's characteristics of learning and memory to solve the problem of liver disease.

4. PROPOSED METHODOLOGY DURING THE RESEARCH WORK:

- 1. Study of Artificial Immune system based algorithm is introduced and applied for Medical Diagnosis system
- 2. To Use the ClonALG Algorithm for Medical Diagnosis system. It can perform pattern recognition and involves the selection of antibodies (candidate solutions) based on affinity either by matching against an antigen pattern or via evaluation of a pattern by a cost function.
- 3. To Collect the Data set from BHMRC Hospital Bhopal that contains 500 Patient data set. The proposed method has been tested on BHMRC (Bhopal Memorial Research Center) patient data set such as person age in terms of years, male / female, WBC, HGB, PLT, Blood Urea, Cretinine. In medical data sets, attributes are typically relatively conditionally independent given the class.

5. CONCLUSION

AIS mimic the biological system and intend to solve any complex problem. AIS algorithms can be implemented along with evolutionary algorithm for classification, prediction and for data analysis. This study gives a framework of AIS algorithms and its procedure for any application. Further the desirable properties of the immune system algorithms can be applied in multiple domains along with artificial neural networks and fuzzy concepts

6. REFERENCES

- [1]. Abe, H., Ohsaki, M., Yokoi, H., & Yamaguchi, T. (2006). Implementing an integrated time-series data mining environment based on temporal pattern extraction methods: A case study of an interferon therapy risk mining for chronic Hepatitis. New Frontiers in Artificial Intelligence, Lecture Notes in Computer Science, 4012, 425–435
- [2]. Rami J.Oweis (2013). Survey and critique of techniques for extracting rules from trained artificial neural networks. Knowledge-Based Systems, 8(6), 373–389.
- [3]. N.Benamrane. (2007). Comparing analytical decision support models through boolean rule extraction: A case study of ovarian tumour malignancy. Advances in Neural Networks, Lecture Notes in Computer Science, 4492, 1177–1186.
- [4]. Ian Middleton (2013). Fast neural network learning algorithms for medical applications. Neural Computing and Applications, 23(3–4), 1019–1034.
- [5]. S. Shen (2007). Therapeutic drug monitoring of kidney transplant recipients using profiled support vector machines. IEEE Transactions on Systems, Man, and Cybernetics, Part C: Applications and Reviews, 37(3), 359– 372.
- [6]. Clarke, C. J., González, P., Del Jesus, M. J., Navío-Acosta, M., & Jiménez-Trevino, L. (2010). Evolutionary fuzzy rule extraction for subgroup discovery in a psychiatric emergency department. Soft Computing, 15(12), 2435– 2448.
- [7]. Jaafar and Ali (2014). Rule Extraction: from neural architecture to symbolic representation. Connection Science, 7, 3–27.
- [8]. Gupta and Shreevastava (2006). Mammogram segmentation by contour searching and mass lesions classification with neural network. IEEE Transactions on Nuclear Science, 53(5), 2827–2833.
- [9]. Kadhim Qeethara (2000). Computerized decision support in medical imaging. IEEE Engineering in Medicine and Biology Magazine, 19(5), 89–96.
- [10]. K. Anooj (2012). Tele-EEG in the UK: A report of over 1000 patients. Journal of Telemedicine and Telecare, 18(5), 243–246.
- [11]. Shantakumar B. Patil. (2007). A new medical decision making system: Least square support vector machine (LSSVM) with fuzzy weighting pre-processing. Expert Systems with Applications, 32(2), 409–414.

- [12]. G. Subbalakshmi, Mr. K. Ramesh and Mr. M. Chinna Rao (2009). Faster self-organizing fuzzy neural network training and a hyperparameter analysis for a brain–Computer Interface. IEEE Transactions on Systems, Man, and Cybernetics, Part B: Cybernetics, 39(6), 1458–1471.
- [13]. Milan Kumari. (2005). Predicting breast cancer survivability: A comparison of three data mining methods. Artificial Intelligence in Medicine, 34(2), 113–127.
- [14]. S. B. Patel. (2012). Application of the fuzzy ARTMAP neural network model to medical pattern classification tasks. Artificial Intelligence in Medicine, 8(4), 403–428.
- [15]. Farhad Soleimanian Gharehchopogh (2013). A novel medical decision support system. Computing & Control Engineering Journal, 7(4), 177–183.
- [16]. Jacqulin Margret. (2013). Bootstrap methods: Another look at the Jackknife. The Annals of Statistics, 7(1), 1– 26.
- [17]. Osareh, Shadgar, and Markham (2014). An introduction to the bootstrap. New York: Chapman and Hall. Exarchos, T. P., Tzallas
- [18]. Ma and Wang (2006). LEAD: A methodology for learning efficient approaches to medical diagnosis. IEEE Transactions on Information Technology in Biomedicine, 10(2), 220–228.
- [19]. Kondo, Kondo, and Ueno (2013). Differential evolution for automatic rule extraction from medical databases. Applied Soft Computing, 13(2), 1265–1283.
- [20]. Walczak (2007). Early breast cancer prognosis prediction and rule extraction using a new constructive neural network algorithm. Computational and Ambient Intelligence, Lecture Notes in Computer Science, 4507, 1004– 1011.
- [21]. Srinivasan, Eswaran, and Sriraam (2008). Principal component analysisenhanced cosine radial basis function neural network for robust epilepsy and seizure detection. IEEE Transactions on Biomedical Engineering, 55(2), 512–518.
- [22]. Ribeiro, Traina, Traina, and Azevedo-Marques (2012). Data mining: Concepts and techniques (3rd ed.). MA, USA: Morgan Kaufmann.
- [23]. Jesus, Navío-Acosta, and Jiménez-Trevino (2012). Building expert systems. London: Addison-Wesley.
- [24]. Hua Yang et al. (2006). Extracting fuzzy rules from polysomnographic recordings for infant sleep classification. IEEE Transactions on Biomedical Engineering, 53(10), 1954–1962.
- [25]. Liang. (2006). Maximizing sensitivity in medical diagnosis using biased minimax probability machine. IEEE Transactions on Biomedical Engineering, 53(5), 821–831.
- [26]. Isola, R., Carvalho, R., & Tripathy, A. K. (2012). Knowledge discovery in medical systems using differential diagnosis, LAMSTAR, and k-NN. IEEE Transactions on Information Technology in Biomedicine, 16(6), 1287– 1295.
- [27]. Kahramanli, H., & Allahverdi, N. (2009). Extracting rules for classification problems: AIS based approach. Expert Systems with Applications, 36(7), 10494–10502.
- [28]. Karayiannis, N. B., Mukherjee, A., Glover, J. R., Ktonas, P. Y., Frost, J. D., Hrachovy, R. A., et al. (2006). Detection of pseudo sinusoidal epileptic seizure segments in the neonatal EEG by cascading a rule-based algorithm with a neural network.

A Review of Security Issues In Cloud Computing

Shital Gupta¹, Sana Siddiqui², Komal Tahiliani³

Assocaite Professor, SORT, PEPOPLE'S UNIVERSITY BHOPAL

ABSTRACT

The recent emergence of cloud computing has drastically altered everyone's perception of infrastructure architectures, software delivery and development models. Projecting as an evolutionary step, following the transition from mainframe computers to client/server deployment models, cloud computing encompasses elements from grid computing, utility computing and autonomic computing, into an innovative deployment architecture. This rapid transition towards the clouds, has fuelled concerns on a critical issue for the success of information systems, communication and information security. From a security perspective, a number of unchartered risks and challenges have been introduced from this relocation to the clouds, deteriorating much of the effectiveness of traditional protection mechanisms. As a result the aim of this paper is twofold; firstly to evaluate cloud security by identifying unique security requirements and secondly to attempt to present a viable solution that eliminates these potential threats. This paper proposes introducing a Trusted Third Party, tasked with assuring specific security characteristics within a cloud environment. The proposed solution calls upon cryptography, specifically Public Key Infrastructure operating in concert with SSO and LDAP, to ensure the authentication, integrity and confidentiality of involved data and communications. The solution, presents a horizontal level of service, available to all implicated entities, that realizes a security mesh, within which essential trust is maintained.

KEYWORDS: Utility computing, Grid computing

1 Introduction

With the rapid development of processing and storage technologies and the success of the Internet, computing resources have become cheaper, more powerful and more ubiquitously available than ever before. This technological trend has enabled the realization of a new computing model called cloud computing, in which resources (e.g., CPU and storage) are provided as general utilities that can be leased and released by users through the Internet in an on-demand fashion. In a cloud computing environment, the traditional role of service provider is divided into two: the infrastructure providers who manage cloud platforms and lease resources according to a usage-based pricing model, and service providers, who rent resources from one or many infrastructure providers to serve the end users. The emergence of cloud computing has made a tremendous impact on the Information Technology (IT) industry over the past few years, where large companies such as Google, Amazon and Microsoft strive to provide more powerful, reliable and cost-efficient cloud platforms, and business enterprises seek to reshape their

business models to gain benefit from this new paradigm. Indeed, cloud computing provides several compelling features that make it attractive to business owners.

2 Related Technologies

Cloud computing is often compared to the following technologies, each of which shares certain aspects with cloud computing: Grid Computing: Grid computing is a distributed computing paradigm that coordinates networked resources to achieve a common computational objective. The development of Grid computing was originally driven by scientific applications which are usually computation-intensive. Cloud computing is similar to Grid computing in that it also employs distributed resources to achieve application-level objectives. However, cloud computing takes one step further by leveraging virtualization technologies at multiple levels (hardware and application platform) to realize resource sharing and dynamic resource provisioning. Utility Computing: Utility computing represents the model of providing resources on-demand and charging customers based on usage rather than a flat rate. Cloud computing can be perceived as a realization of utility computing. It adopts a utility-based pricing scheme entirely for economic reasons. With ondemand resource provisioning and utility based pricing, service providers can truly maximize resource utilization and minimize their operating costs. Virtualization: Virtualization is a technology that abstracts away the details of physical hardware and provides virtualized resources for highlevel applications. A virtualized server is commonly called a virtual machine (VM). Virtualization forms the foundation of cloud computing, as it provides the capability of pooling computing resources from clusters of servers and dynamically assigning or reassigning virtual resources to applications on-demand. Autonomic Computing: Originally coined by IBM in 2001, autonomic computing aims at building computing systems capable of self-management, i.e. reacting to internal and external observations without human intervention. The goal of autonomic computing is to overcome the management complexity of today's computer systems. Although cloud computing exhibits certain autonomic features such as automatic resource provisioning, its objective is to lower the resource cost rather than to reduce system complexity. In summary, cloud computing leverages virtualization technology to achieve the goal of providing computing resources as a utility. It shares certain aspects with grid computing and autonomic computing but differs from them in other aspects. Therefore, it offers unique benefits and imposes distinctive challenges to meet its requirements.

In cloud computing, the available service models are:

• Infrastructure as a Service (IaaS). Provides the consumer with the capability to provision processing, storage, networks, and other fundamental computing resources, and allow the consumer to deploy and run arbitrary software, which can include operating systems and applications. The consumer has control over operating systems, storage, deployed applications, and possibly limited control of select networking components.

 Platform as a Service (PaaS). Provides the consumer with the capability to deploy onto the cloud infrastructure, consumercreated or acquired applications, produced using programming languages and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly application hosting environment configurations. • Software as a Service (SaaS). Provides the consumer with the capability to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices, through a thin client interface, such as a web browser (e.g. web-based e-mail). The consumer does not manage or control the underlying cloud infrastructure, including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited userspecific application configuration settings.

Four deployment models have been identified for cloud architecture solutions, described below:

 Private cloud. The cloud infrastructure is operated for a private organization. It may be managed by the organization or a third party, and may exist on premise or off premise.

 Community cloud. The cloud infrastructure is shared by several organizations and supports a specific community that has communal concerns (e.g., mission, security requirements, policy, and compliance considerations). It maybe managed by the organizations or a third party, and may exist on premise or off premise.

 Public cloud. The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services.

• Hybrid cloud. The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities, but are bound together by standardized or proprietary technology, that enables data and application portability (e.g., cloud bursting for load-balancing between clouds).

A number of key characteristics of cloud computing have been identified [6,7]:

Flexibility/Elasticity: users can rapidly provision computing resources, as needed, without human interaction. Capabilities can be rapidly and elastically provisioned, in some cases automatically, to quickly scale out or up.

Scalability of infrastructure: new nodes can be added or dropped from the network as can physical servers, with limited modifications to infrastructure set up and software. Cloud architecture can scale horizontally or vertically, according to demand.

Broad network access. Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous platforms (e.g., mobile phones, laptops, and PDAs).

Location independence. There is a sense of location independence, in that the customer generally has no control or knowledge over the exact location of the provided resources, but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter).

Reliability improves through the use of multiple redundant sites, which makes cloud computing suitable for business continuity and disaster recovery.

Economies of scale and cost effectiveness. Cloud implementations, regardless of the deployment model, tend to be as large as possible in order to take advantage of economies of scale. Large cloud deployments can often be located close to cheap power stations and in low-priced real estate, to lower costs.

3 Cloud computing security Confidentiality and privacy

ISSN No.2278-8050

Confidentiality refers to only authorized parties or systems having the ability to access protected data. The threat of data compromise increases in the cloud, due to the increased number of parties, devices and applications involved, that leads to an increase in the number of points of access. Delegating data control to the cloud, inversely leads to an increase in the risk of data compromise, as the data becomes accessible to an augmented number of parties. A number of concerns emerge regarding the issues of multitenancy, data remanence, application security and privacy. Data confidentiality in the cloud is correlated to user authentication. Protecting a user's account from theft is an instance of a larger problem of controlling access to objects, including memory, devices, software etc. Electronic authentication is the process of establishing confidence in user identities, electronically presented to an information system. Lack of strong authentication can lead to unauthorized access to users account on a cloud, leading to a breach in privacy.

Integrity

A cloud computing provider is trusted to maintain data integrity and accuracy. The cloud model presents a number of threats including sophisticated insider attacks on these data attributes. Software Integrity refers to protecting software from unauthorized deletion, modification, theft or fabrication. Deletion, modification or fabrication can be intentional or unintentional. For instance a disgruntled employee may intentionally modify a program to fail when certain conditions are met or when a certain time is reached. Cloud computing providers implement a set of software interfaces or APIs that customers use to manage and interact with cloud services. In addition to previously mentioned threats, the security of cloud services depends heavily on the security of these interfaces as an unauthorized user gaining control of them could alter delete or fabricate user data. In the cloud, responsibility for the protection of the software's integrity is transferred to the software's owner or administrator. Hardware and network integrity is an additional issue that needs to be addressed by the cloud provider, as he is burdened with protecting the underlying hardware from theft, modification and fabrication.

Availability

Availability refers to the property of a system being accessible and usable upon demand by an authorized entity. System availability includes a systems ability to carry on operations even when some authorities misbehave. The system must have the ability to continue operations even in the possibility of a security breach. Availability refers to data, software but also hardware being available to authorized users upon demand. Leveraging users from hardware infrastructure demands, generates a heavy reliance on the ubiquitous network's availability. The network in now burdened with data retrieval and processing.

Security identification of threats

Essentially securing an Information System (IS), involves identifying unique threats and challenges which need to be addressed by implementing the appropriate countermeasures. Ultimately, the identified security requirements and selected security controls are introduced to the standard systems engineering process, to effectively integrate the security controls with the information systems functional and operational requirements, as well as other pertinent system

requirements (e.g., reliability, maintainability, supportability) [17]. Cloud computing due to its architectural design and characteristics imposes a number of security benefits, which include centralization of security, data and process segmentation, redundancy and high availability. While many traditional risks are countered effectively, due to the infrastructures singular characteristics, a number of distinctive security challenges are introduced. Cloud computing has "unique attributes that require risk assessment in areas such as availability and reliability issues, data integrity, recovery, and privacy and auditing" [18].

4 Conclusions

Cloud computing will support a surplus of information systems as the benefits outnumber its shortcomings. Cloud computing offers deployment architecture, with the ability to address vulnerabilities recognized in traditional IS but its dynamic characteristics are able to deter the effectiveness of traditional countermeasures. In this paper we have identified generic design principles of a cloud environment which stem from the necessity to control relevant vulnerabilities and threats. To do so, software engineering and information systems design approaches were adopted. Security in a cloud environment requires a systemic point of view, from which security will be constructed on trust, mitigating protection to a trusted third party.

References

[1] K. Stanoevska-Slabeva, T. Wozniak, Grid and Cloud Computing-A Business Perspective on Technology and Applications, Springer-Verlag, Berlin, Heidelberg, 2010.

[2] Dimitrios Zissis, Dimitrios Lekkas," Addressing cloud computing security issues", Future Generation Computer system, ELSEVIER, 2010.

[3] E. Naone, Technology overview, conjuring clouds, MIT Technology Review, July–August, 2009.

[4] National Institute of Standards and Technology, The NIST Definition of Cloud Computing, Information Technology Laboratory, 2009.

[5] Merrill Lynch, The cloud wars: \$100+ billion at stake, Merrill Lynch, 2008.

[6] G. Reese, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, in: Theory in Practice, O'Reilly Media, 2009.

[7] B. Rajkumar, C. Yeo, S. Venugopal, S. Malpani, Cloud computing and emerging IT platforms: vision, hype, and reality for delivering computing as the 5th utility, Future Generation Computer Systems (2009).

[8] D. Artz, Y. Gil, A survey of trust in computer science and the semantic web, Journal of Web Semantics: Science, Services and Agents on the World Wide Web (2007).

[9] DoD Computer Security Center, Trusted computer system evaluation criteria, DoD 5200.28-STD, 1985.

[10] A. Nagarajan, V. Varadharajan, Dynamic trust enhanced security model for trusted platform based, Future Generation Computer Systems (2010) doi:10.1016/j.future.2010.10.008.

[11] International Telecommunication Union, X-509 | ISO/IEC 9594-8, The directory: Public-key and attribute certificate frameworks, ITU, X-Series, 2001.

[12] D. Lekkas, Establishing and managing trust within the public key infrastructure, Computer Communications 26 (16) (2003).

[13] A. Giddens, The Consequences of Modernity, Polity Press, UK, 1991.

[14] K. Tserpes, F. Aisopos, D. Kyriazis, T. Varvarigou, Service selection decision support in the Internet of services, in: Economics of Grids, Clouds, Systems, and Services, in: Lecture Notes in Computer Science, vol. 6296, 2010, pp. 16–33. doi:10.1007/978-3-642-15681-6_2.

[15] R. Sherman, Distributed systems security, Computers & Security 11 (1) (1992).

[16] D. Lekkas, S. Gritzalis, S. Katsikas, Quality assured trusted third parties for deploying secure Internet-based healthcare applications, International Journal of Medical Informatics (2002).

[17] National Institute of Standards and Technology. Guide for mapping types of information and information systems to security categories, NIST 800-60, 2008.

[18] Gartner. Assessing the security risks of cloud computing, Gartner, 2008.

[19] Cloud Security Alliance. Top threats to cloud computing, Cloud Security Alliance, 2010.

A Review of Various Efficient Techniques and Its Related Measures for Security Related Problems

Ms.Varsha Jotwani^[1], Dr.Amit Dutta^[2],Madhu Singh^[3]

1,AISECTUniversity,BHOPAL varsha.jotwani@gmail.com

2Deputy Director, AICTE, New Delhi amitduuta07@gmail.com

3 Astt Prof of Computer Science ,SHGC,bhopal madhusingh13383@gmail.com

Abstract

Providing secure communication over insecure open networks has been a great concern for researchers. During recent years, cryptographic approaches have been applied to remove these problems, although the security research community has explored dozens of proposals for replacing or strengthening passwords, they appear likely to remain entrenched as the standard mechanism of human-computer authentication on the Internet for years to come. A number of useful privacy enhancing technologies (PETs) have been developed for dealing with privacy issues and previous works on privacy protection have focused on a wide variety of topics. In general, authentication services may require three factors, i.e., password, smart card and biometric characteristics.

Keywords: Password Based Authentication, Smart Card Authentication

Introduction

Most password-based user verification organizations place total belief on the confirmation server where keywords or easily resultant password corroboration data are deposited in an essential database. These organizations could be effortlessly bargained by offline dictionary attacks familiarized at the server side. Cooperation of the verification server by either foreigners or insiders focuses all user passwords to experience and may have thoughtful glitches. To overwhelmed these difficulties in the solitary server organization many of the organizations has been planned such as multi server organizations, public key cryptography and keyword organizations, threshold keyword authentication organizations, two server keyword authentication schemes. Most password-based user verification organizations residence total belief on the verification server where keywords or easily resultant password confirmation statistics are stowed in a dominant database.

Traditional procedures for password-based confirmation undertake a single server which supplies all the evidence (e.g., the password) essential to confirm a user. Password based verification is the most normally used object confirmation method, due to the circumstance that no protected storage is compulsory, and a user only requirements to remember his password and then can validate anywhere, anytime. Most of the existing password based verification arrangements undertake the single-server classical where a single waitperson happens in an organization. The chief problem of the single server classical is that the server may consequence in a single fact of catastrophe, in the sense that negotiation of the server exposes all user passwords held by the server. [1] A protection that increases the variable costs for the attacker. Attacking one user is expensive, but not entirely unrealistic for the fraudster. However, attacking a second user imposes almost the full amount of work on the fraudster again, making the whole scam uneconomical for him. The approach is based on two major changes compared to current solutions. The first one is the use of individualized key derivation functions, which ensure that given the same input, each copy of the application ends up with different keys. Scheming a secure keyword based organization is a precise task that has attracted many cryptographers. Bellov in and Merritt proposed the encrypted key exchange (EKE) protocol.

The EKE procedure permits two communiqué entities to confirm each other and to create a sitting key for fortifying later programmers via a weak keyword. Since then, numerous two-party password-based authenticated key establishment (2PAKE) procedures have been planned to advance security and presentation. These schemes consider authentication between a client and a server and assume that the two involved objects are client and server correspondingly and they share a common password. With diversity and development of communication environments in the fields such as mobile networks, home networking and etc., these types of communication networks intends to integrate into the Internet and the end to-end security is considered as one of the key issues in designing next generation Internet technology.

2. Techniques for Security notions

2.1 Password Authenticated Key Exchange Protocols: Password Authenticated Key Exchange (PAKE) protocols authorize a client and a server to confirm each other between the sender and receiver and then generate a strong general session key all the way through a pre-shared human impressive password over an insecure channel on the existing Network.[2] Password Authenticated Key Exchange (PAKE) protocols enable two entities to agree on a frequent session key based on a pre-shared human impressive password. So the proficient make safe two-party PAKE protocol is proposed to provide several securities attributes while the efficiency is also improved. In this work we are going to implement an efficient key exchange mechanism using concept of an efficient secure two-party PAKE protocol is designed to provide several securities attributes while the efficiency is also improved.

2.2 Smart Card Based Authentication: Password authentication with smart card is one of the most expedient and effective two-factor confirmation instruments for remote organizations to guarantee one collaborating party of the lawfulness of the consistent party by gaining of corroborative evidence. This method has been widely positioned for numerous kinds of confirmation requests, such as remote host login, online banking, e-commerce and e-health [4]. In addition, it constitutes the basis of three-factor authentication [3]. Though, there still happens trials in both security and presentation features due to the strict security necessities and reserve strained features of the patrons.

Introduced the first distant user confirmation arrangement using smart cards there have been many of such arrangements planned [4].

2.3 Issues and Challenges And Its Security Schemes[5]

- Forward secrecy: If the user's password or the server's private key is revealed, the secrecy of formerly established session keys should not be revealed.
- Known session key security: Disclosure of one sitting key should not reveal other session keys.
- **Resilience to Denning-Sacco attack:** Disclosure of assembly key should not permit an attacker to calculate or guess the password.
- **Resilience to password compromise impersonation attack:** Password compromise of any user A should not enable an attacker to share any session key with A by impersonating himself/herself as any other entity.

- Resilience to Unknown Key Share (UKS) attack: User A should not be coerced into sharing a key with an attacker while he thinks that his key is shared with another user B.
- **Resilience to off-line dictionary attack:** If an attacker could guess a password, he should not be able to check his guess off-line.
- **Resilience to undetectable on-line dictionary attack:** If the attacker could guess a password in an on-line transaction, he should not be able to check the correctness of his guess by using responses from the server and the server is also able to detect an honest appeal from a hateful appeal.
- **Resilience to replay attack:** An attacker or originator, who captured the exchanged data, should not be able to reuse it maliciously.

Reference

[1]Martin Boesgaard and Erik Zenner, "Protecting Online Transactions with Unique Embedded Key Generators Second International Conference on Availability, Reliability and Security (ARES'07) 0-7695-2775-2/07 2007.

[2] H. Pagnia, H. Vogt and F. C. Gartner," Fair Exchange" The Computer Journal, 2003.

[3]J.K.Lee,S.R.	Ryu,andK.Y.Yoo	o,"Fingerprint-	-Based	dRemote User	Authentication	SchemeUsing	SmartCards,"
Electronics	Letters,	vol.		38,	no. 12,	pp.	554-
555, June 2002.							
[4]C.C.	Chang	and	I.C.	Lin,	"Remarks	on	Fingerprint-
Based	Remote	User	A	uthentication	Scheme	Using	Smart
Cards,"	ACM	SIGOPS		Operating	Systems	Rev.,	vol.
38, no. 4, pp. 91-96, Oct. 2004.							

[5] Chi Po Cheong, Chris Chatwin, Rupert Young, "A New Secure Token For Enhancing Web Service Security" 978-1-4244-8728-8/11/ IEEE 2011.

Mobile Health Care Systems: Challenges and Opportunities

Honey Sharma

Research Scholar IMS, DAVV hsharma.0496@gmail.com

Abstract

We humans always have a keen desire to make sense of our surroundings, but are always a step behind when the concern is about looking into our inner selves or keeping an eye on the inmost transformations. In this fast changing world where we are embracing countless technological advancement, why not make the best use to supervise one's own health? Among the panoply of services provided by the mobile systems, the most prominent one lies into the healthcare sector. One such approach is Mobile Health Care Systems. This paper is an effort to (a) Highlight the opportunities in sensor enabled mobile health care systems (b) Identify the open issues and challenges (c) Explore the present status of mobile health management in developing countries. **Keywords:** Mobile Health-Care Systems, Sensors

Introduction

With the rapid evolvement in the mobile landscape, mobile devices have become an integral part of our lives. The flexibility in communication, collaboration and information sharing has made the mobile devices a potential Information and Communication Technology (ICT) tool. By the end of 2017 the number of mobile phone users is expected to reach 4.77 billion. The consistent growth in mobility has oriented significant features that have improved the quality of service. One prominent area in this regard is the healthcare sector where mobile health care applications have become a necessity rather an option [2] Mobile health care (often shortened to m-Health) according to WORLD HEALTH ORGANIZATION is the medical practice with the help of mobile devices [6] such as mobile phones, tablets, personal digital assistants and other wireless devices. More specifically m-Health refers to the delivery, facilitation and communication of health related information. Healthcare systems are at the cusp of being revolutionized by the improvement in technology, which can be fitted into the existing best practices so as to enable a safer cure, liberal doctor-patient communication and personalized treatment at lower cost. Incorporation of wireless sensors with mobile devices puts diagnosis and treatment decisions directly in the possession of patients. It won't be lame to imagine a time in near future where the sensors will be monitoring and collecting physiological parameters thereby adding it to an individual's health record. When you show up for the physical examination the doctor has not only the clinical data but also an affluent sensor record. [2] Such an unconventional idea could have a breath-taking impact on the global healthcare system, drastically lower the cost of diagnosis and increase the speed and accuracy.

Trends and Opportunities:

Smarter healthcare has attracted many people in the suburbs but several disciplines, applications and opportunities are yet to be explored. Some of the astonishing trends in m-Health are

- **Telemedicine:** Telemedicine in simplest form is the practice of using information and communication technology where clinical advice or service can be shared. It has three main categories: store and forward, remote monitoring and interactive services. The best use of the concept lies in the underserved regions and the patients who are unable to reach for their treatment. Since the idea of telemedicine is inherently mobile it will have a rising impact on the mobile health field.
- Smart Wearable's: Innovation in electronic healthcare can readily grab the attention of doctors and patients both. Smart Wearable Body Sensors include a wide range of devices such as gyroscope, smart watches and lenses, fitness tracker etc
- PERS: Personal Emergency Response Systems or Medical Emergency Response Systems are used to call for help in emergency by pushing a button. PERS has a transmitter, a console and an emergency response centre. The concept evolves in the form of location tracking and fallmonitoring.

These are just few features out of the list. In addition, device communication has certainly bypassed the classical model. Looking ahead advanced solutions such as implanted sensors, robot inside patients and doctors, secure data connectivity can open a wealth of opportunities. M-Health will always stay in expansion due to changes in technology. The greatest leap in this field will be taken when the connectivity will be reached to the most remote parts of the globe; specially the rural areas. There is an uttermost need to have specialized devices and determined health applications. A central regulatory body managing the training and awareness programs for the patients and doctors along with the cost effective measure will prove to be an aid in the m-Health domain.

Open Issues and Current Status: People are going mobile. In the past few years there has been a flood of mobile devices from- tablets to wearables. Now when the healthcare integrates with mobility there are clear bunch of opportunities; with the clear solutions there comes a set of challenges like:

- Data Security and confidentiality: Security and privacy of healthcare information is the biggest concern. Mobile health needs a proper set of guidelines, definite rules and regulations so that the patient health information (PHI) can be handled in a secure way.
- Reliability of devices: Additional overhead adds to when brand damage occurs due to the poorly developed applications and mobile devices. Unnecessary alarms and reminders in the devices has led to anxiety in patients, thereby increasing the clinical visits. The patients are obvious to lose interest and they get frustrated quickly.
- **Cost issues:** India being a self funded market with poor health infrastructure special cost effective steps are not yet developed. Most of the physicians in government hospitals do not have smart devices at work. Researchers are finding solution to secure patients data but it needs a huge investment from the government's part.
- Lack of central authority: There is no central regulatory body in developing countries that is responsible for the healthcare. In the absence of regulatory measure, safeguarding the patient data is on a broken bridge.

- Market Volatility: It is hard to keep the consumers, devices and market conditions in pace. The
 needs and demands of the consumers change during the course of time, market conditions
 change abruptly and the devices evolve rapidly. Moreover the innovations done in the mobile
 devices are seldom exploited.
- Integration with IT systems: Development of mobile applications and the use mobile devices can be promoted but the healthcare organizations need to be sure of integrating these changes with the existing IT systems and standards.

India's health system is patchy, with underfunded and overcrowded hospitals and clinics and inadequate rural service. The statistics for India's health infrastructure are below than that of other countries. It has only one bed to 1,050 patients. Shortage of qualified medical professional is also a key challenge to the Indian health care industry. Now the question arises what should be the next prodigious step? One of the ways to increase the funding is though the public-private partnership. Initiatives are being made to introduce low cost smart-phones. For the funding WHO and World Bank are pushing government to set up strategic approach and continued funding for public health. For the complete evaluation, companies and government are making better and smarter systems which make evaluations more efficient, hopefully staying ahead of the tech curve.

Conclusion

This paper presents the potential of m-Health systems, which can replace the traditional health care services by taking the advantage of the sensing capabilities of smart-phones and mobility. With the ageing population, increase in sedentary lifestyle leading to chronic illness, technology can be put to use for the m-Health initiatives. In developing countries like India, with phenomenal increase in smart-phone penetration, the opportunity is tremendous. We have discussed the trends and opportunities of m-Health systems along with the risk factors. On one side of coin there are breakthroughs and on the other side there are challenges which beam out major security concerns. For the progression of m-Health government should invest in preventive and social medicine by promoting health education and preventive health-care concepts.

REFERENCES

[1] Poonguzhali P., Prajyot Dhanokar, M.K. Chaithanya, Mahesh U. Patil(2016), "Secure Storage of data on Android Based Devices", IACSIT International Journal of Engineering and Technology, Vol 8. No. 3

[2] Moeen Hasanaaliragh, Alex Page, Tolga Soayata, Gaurav Sharma, Mehmet Aktas, Gonzalo Mateos, Burak kantarci, Silwana Andreescu(2015), "Health Monitoring and Management Using Internet--of-Things Sensing with Cloud-based processing: Opportunities and Challenges", IEEE International Conference on Services Computing [3] kaushal Modi, Radha Baran Mohanty(2015), "M-Health: challenges, benefits and keys to successful implementation" External Document Infosys Limited.

[4] Mobile Healthcare Technology Trends and Innovation (2015) written and published by mPulse Mobile Inc.

[5] K. Kiran Reddy, P.Ialith Samanth Reddy, Dr.P.Bhaskara Reddy(2014), "Study on Mobile Healthcare System", International Journal of Advanced Research in Computer Science and Software Engineering, Vol 4, Issue 3, pp. 143-148

[6] Caroline Free, Gemma Phillips, Leandro Galli, Louise Watson, Lambert Felix, Phil Edwards, Vikram Patel, Andy Haines(2013) "The effectiveness of Mobile-Health Technology-Based Health Behavior Change or Disease Management Interventions for Health Care Consumers: A Systematic Review", Vol 10, Issue 1

[7] Luis Carlos Jersak, Adriana Cassia da Costa, and Daniel Antonio Callegari(2013), "A Systematic Review on Mobile Health Care", The Research Group of the PDTI, vol 1, Technical Report- 073

[8] Snehal D. Nanhore, Mahip M. Bartere(2013), "Mobile Phone Sensing System for Health Monitoring", International Journal of Science and Research (IJSR), Vol 2, Issue 4, pp. 252-255

[9] Santosh Kumar, Wendy J Nilsen, Amy Abernethy, Susan A. Murphy, Charlene Quinn, Vladimir Shusterman, Dallas Swendeman(2013), "Mobile Health Technology Evaluation" Published by Elsevier Inc. on behalf of American Journal of Preventive Medicine, pp. 228-236

[10] Khalid Elgazzar, Muhammad Aboelfotoh, Patrik Martin, Hossam S. Hassanein(2012), "Ubiquitous Health Monitoring Using Mobile Web Services" The 3rd International Conference on Ambient Systems, Networks and Technologies(ANT), pp. 332-339

[11] Sasikant Avancha, Amit Baxi, David Kotz(2012), "Privacy In Mobile technology for Personal Healthcare" ACM Computing Surveys, Vol 35, Article 3.

Prevention of Data Content Leakage with Secured Encryption Algorithm

Sagar Prasad ¹ Malti Nagle ² Tarique Zeya Khan³

Comp Sci & Engg SCET College

prasad.sagar4@gmail.com

nagle.malti083@gmail.com

tariquezeya1987@gmail.com

Abstract

The information leak of sensitive data on systems has a serious threat to organization data security. Statistics show that the improper encryption on files and communications due to human errors is one of the leading causes of information loss. So there a need tools to identify the exposure of sensitive data by monitoring the content in storage and transmission. However, detecting the exposure of sensitive data information is challenging due to data transformation in the content. Transformations result in highly unpredictable leak patterns. In this paper, it is utilize sequence alignment techniques used for detecting complex data-leak patterns. This algorithm is designed for detecting long and inexact sensitive data patterns. This detection is paired with a comparable sampling algorithm, which allows one to compare the similarity of two separately sampled sequences. The system achieves good detection accuracy in recognizing transformed leaks. It implements a parallelized version of our algorithms in graphics processing unit to achieve high analysis data. In the case of collective privacy preservation, organizations have to cope with some interesting conflicts. For instance, when personal information undergoes analysis processes that produce new facts about users' shopping patterns, hobbies, or preferences, these facts could be used in recommender systems to predict or affect their future shopping patterns. In general, this scenario is beneficial to both users and organizations. However, when organizations share data in a collaborative project, the goal is not only to protect personally identifiable information but also sensitive knowledge represented by some strategic patterns. To demonstrate the high multithreading scalability of the data leak detection method required by a requirement of organization.

Keywords— Information leak detection, content inspection, sampling, alignment, dynamic programming, and sensitive data patterns.

I. INTRODUCTION

To minimize the exposure of sensitive data and documents, an organization needs to prevent clear text sensitive data from appearing in the storage or communication. In today's increasingly digital world, there is often a tension between safeguarding privacy and sharing information. Although, in general, sensitive data clearly needs to be kept confidential data owners are often motivated, or forced, to share sensitive information Privacy-Preserving Sharing of Sensitive Information , and proposes one efficient and secure instantiation that functions as a privacy shield to protect parties from disclosing more than the required minimum of sensitive information. We model in the context of simple database-querying applications with two parties: a server that has a database, and a client, performing simple disjunctive equality queries detecting the exposure of sensitive information are challenging due to data transformation in the content. Transformations result in highly unpredictable leak patterns. In this paper, we utilize sequence alignment techniques for detecting complex data-leak asymmetric cryptography, facilitate the creation of a verifiable association between a public key and the identity other attributes of the holder of the corresponding private key, for uses such as authenticating the identity of a specific entity, ensuring the integrity of information, providing support for non repudiation, and establishing an encrypted communications section.

II. Brief Literature Survey

Big data analysis system concept for detecting unknown attacks:<u>Sung-Hwan Ahn Nam-Uk Kim,Tai-Myoung Chung</u>. 16-19 Feb. 2014(IEEE). Unknown cyber-attacks are increasing because existing security systems are not able to detect them. Big data analysis techniques that can extract information from a variety of sources to detect future attacks. The event of new and previously unknown attacks, detection rate becomes very low and false negative increases. To defend against these unknown attacks. Does not detect future Advanced Persistent Threat (APT) detection.[1] Big Data Analytics with Hadoop to analyse Targeted Attacks on Enterprise Data: Bhawna Gupta, Dr.Kiran Joyti in Journal of Computer Science and Information Technologies, Vol.5, 2014, (IEEE). Big data security analytics is used for the growing practice of organization to gather and analyse security data to detect vulnerabilities and intrusions. Security and Information Event Monitoring (SIEM) system. The malicious and targeted attacks have become main subject for government, organization or induct. Big data analytics is the process of analysing big data to find hidden patterns, unknown correlations and other useful information that can be extracted to

make better decisions. It is used effectively and at the same time, hackers can leave their targets forever.[2] Zero Day Attack Signatures Detection Using Honeypot: Musca, Mirica, E.; Deaconescu, R. IEEE 29-31 May 2013. Unexpected behavior. Fault distribution studies show that there is a correlation between the number of lines of code and the number of faults. LCS algorithm on the packet content of a number of connections going to the same services. Zero-day attack or threat is a computer threat that tries to exploit computer application vulnerabilities that are unknown to others or undisclosed to the software developer. Vulnerability window which is the time between the first exploitation of vulnerability and when software developers start to develop a countermeasure to that threat. [3]Cloud Model based Outlier Detection Algorithm for Categorical Data: Dajiang Lei Liping Zhang And Lisheng Zhang, Vol. 6, No. 4, August, 2013. Numerical data but there will be a large number of categorical data in real life. Some outlier detection algorithm shave been designed. for categorical data. There are two main problems of outlier detection for categorical data, which are the similarity measure between categorical data objects and the detection efficiency. Outlier detection algorithm for categorical data. Efficient outlier detection can help us make good decisions on erroneous data or prevent the negative influence of malicious and faulty behaviour. Many data mining techniques try to reduce the influence of outliers or eliminate them entirely. The in fore mention manner may result in the loss of important hidden information.[4][5]Cloud Computing-Based Forensic Analysis for Collaborative Network Security Management System: Zhen Chen*, Fuye Han, Junwei Cao, Xin Jiang, and Shuo Chen.1, February 2013. Internet security problems remain a major challenge with many security concerns such as Internet worms, spam, and phishing attacks. Botnets, well-organized distributed network attacks, consist of a large number of bots that generate huge volumes of spam or launch Distributed Denial of Service (DDoS) attacks on victim hosts. A distributed security overlay network with a centralized security centre leverages a peer-to-peer communication protocol used in the UTMs collaborative module. These new security rules are enforced by collaborative UTM and the feedback events of such rules are returned to the security centre. Collaborative network security management system cannot identify the intrusion.[6] Understanding privacy in data mining requires understanding how privacy can be violated and the possible means for preventing privacy violation. In general, one major factor contributes to privacy violation in data mining: the misuse of data. Users' privacy can be violated in different ways and with different intentions. Although data mining can be extremely valuable in many applications (e.g., business, medical

analysis, etc), it can also, in the absence of adequate safeguards, violate informational privacy. Privacy can be violated if personal data



Fig 1. Dataflow diagram

A typical setting involves two parties: one that seeks information from the other that is either motivated, or compelled, to share (only) the requested information. Consequently, in numerous occasions, there is a tension between information sharing and privacy. On the one hand, sensitive data needs to be kept confidential; on the other hand, data owners may be willing, or forced, to share information.

III.Problem Detected

We extensively evaluate the accuracy of our solution with several types of datasets under a multitude of real-world data leak scenarios. This module allows the user to register their identity into the system with proper input parameters. The key generation centres play a vital role in it,

ISSN No.2278-8050

which generates public/ secret parameters. The key authorities consist of a central authority and multiple local authorities. Assume that there are secure and reliable communication channels between a central authority and each local authority during the initial key setup and generation phase. Each local authority manages different attributes and issues corresponding attribute keys to users. They grant differential access rights to individual users based on the users' attributes. The key authorities are assumed to be honest but curious. That is, they will honestly execute the assigned tasks in the system however they would like to learn information of encrypted contents as much as possible.

IV.PROPOSED SYSTEM

The purpose of this proposed work is to provide the approach functions as a privacy shield to protect parties from disclosing more than the required minimum of their respective sensitive information. PPSSI deployment prompts several challenges, which are addressed in this project. Extensive experimental results attest to the practicality of attained privacy features and show that our approach incurs quite low overhead. For better attack detection, big data incorporates attack graph analytical procedures into the intrusion detection processes. We must note that the design of does not intend to improve any of the existing intrusion detection algorithms; indeed, employs a reconfigurable virtual networking approach to detect and counter the attempts to compromise VMs, thus preventing zombie VMs.

The proposed method has several advantages.

- 1. To avoid the attacker.
- 2. Secrecy of the data should be maintained.
- 3. The scheme is robust to withstand brute force attacks.

Understanding privacy in data mining requires understanding how privacy can be violated and the possible means for preventing privacy violation. In general, one major factor contributes to

privacy violation in data mining: the misuse of data. Users' privacy can be violated in different ways and with different intentions. the absence of adequate safeguards, violate informational privacy. Privacy can be violated if personal data are used for other purposes subsequent to the original transaction between an individual and an organization when the information was collected (Culnan, 1993). One of the sources of privacy violation is called data magnets (Rezgui et al., 2003). Data magnets are techniques and tools used to collect personal data. Examples of

data magnets include explicitly collecting information through on-line registration, identifying users through IP addresses, software downloads that require registration, and indirectly collecting information for secondary usage. In many cases, users may or may not be aware that information is being collected or do not know how that information is collected. In particular, collected personal data can be used for secondary usage largely beyond the users' control and privacy laws. This scenario has led to an uncontrollable privacy violation not because of data mining itself, but fundamentally because of the misuse of data.

- Individual privacy preservation: The primary goal of data privacy is the protection of personally identifiable information. In general, information is considered personally identifiable if it can be linked, directly or indirectly, to an individual person. Thus, when personal data are subjected to mining, the attribute values associated with individuals are private and must be protected from disclosure. Miners are then able to learn from global models rather than from the characteristics of a particular individual.
- Collective privacy preservation: Protecting personal data may not be enough. Sometimes, we
 may need to protect against learning sensitive knowledge representing the activities of a
 group. We refer to the protection of sensitive knowledge as collective privacy preservation. The
 goal here is quite similar to that one for statistical databases, in which security control
 mechanisms provide aggregate information about groups (population) and, at the same time,
 prevent disclosure of confidential information about individuals. However, unlike as is the case
 for statistical databases, another objective of collective privacy preservation is to protect
 sensitive knowledge that can provide competitive advantage in the business world.

In the case of collective privacy preservation, organizations have to cope with some interesting conflicts. For instance, when personal information undergoes analysis processes that produce

new facts about users' shopping patterns, hobbies, or preferences, these facts could be used in recommender systems to predict or affect their future shopping patterns. In general, this scenario is beneficial to both users and organizations. However, when organizations share data in a collaborative project, the goal is not only to protect personally identifiable information but also sensitive knowledge represented by some strategic patterns.





To increase the security level this proposed scheme overcomes the limitation of "Hybrid encryption algorithm proposed. The proposed enhanced scheme includes Triple DES, RSA and MD5.Triple DES (Variant of DES) strengthens the security of Data transmission. Reason behind for selecting triple DES rather than Double DES is that in double DES algorithm the key used for encryption and decryption is suspected to meet-in-middle attack. Key distribution problem and in addition to this, MD5 to verify the integrity of the message. Use of message digest algorithm in combination of cryptographic algorithm.

V. Research Method

- 1. Identity Key Generation The key generation module helps the users to share the information between source and destination. After getting the confirmation response from the receiver side the sender fix the information and encrypt it. At this time a key will be generated and sent to the receiver area. That key is useful for decrypt the data at receiver end. As well as an entity that stores data from senders and provide corresponding access to users. It may be mobile or static. Similar to the previous schemes, and also assume the storage node to be semi trusted that is honest but curious.
- 2. 3DES Based Encryption in Cipher text Policy Attribute based Encryption scheme, the encrypt or can fix the policy, who can decrypt the encrypted message. The policy can be formed with the help of attributes. In access policy is sent along with the cipher text. We propose a method in which the access policy need not be sent along with the cipher text, by which we are able to preserve the privacy of the encrypted. This techniques encrypted

data can be kept confidential even if the storage server is un trusted. Moreover, our methods are secure against collusion attacks. Previous Attribute Based Encryption systems used attributes to describe the encrypted data and built policies into user's keys; while in our system attributes are used to describe a user's credentials, and a party encrypting data determines a policy for who can decrypt.

- 3. Confidential Data Interchange This is an entity who owns confidential messages or data and wishes to store them into the external data storage node for ease of sharing or for reliable delivery to users in the extreme networking environments. A sender is responsible for defining (attribute based) access policy and enforcing it on its own data by encrypting the data under the policy before storing it to the storage node. This is a mobile node who wants to access the data stored at the storage node (e.g., a soldier). If a user possesses a set of attributes satisfying the access policy of the encrypted data defined by the sender, and is not revoked in any of the attributes, then he will be able to decrypt the cipher text and obtain the data.
- 4. Administrative Access Controller The administrator owns full access rights of this entire site. Once the administrator find out any illegal activity or other misusing happens into the way of transaction between the respective sender and receiver then the admin immediately block the user access rights to transact using this site. The block will be unblocked after getting meaningful reason from the user end.

PREVIOUS ALGORITHM CPABE

We propose an attribute-based secure data retrieval scheme using CP-ABE for decentralized DTNs.The proposed scheme features the following achievements. First, immediate attribute revocation enhances backward/forward secrecy of confidential data by reducing the windows of vulnerability. Second, encryptions can define a fine-grained access policy using any monotone access structure under attributes issued from any chosen set of authorities. Third, the key escrow problem is resolved by an escrow-free key issuing protocol that exploits the characteristic of the decentralized DTN architecture. The key issuing protocol generates and issues user secret keys by performing a secure two-party computation (2PC) protocol among the key authorities with their own master secrets. The 2PC protocol deters the key authorities from obtaining any master secret

ISSN No.2278-8050

information of each other such that none of them could generate the whole set of user keys alone. Thus, users are not required to fully trust the authorities in order to protect their data to be shared. The data confidentiality and privacy can be cryptographically enforced against any curious key authorities or data storage nodes in the proposed scheme.

DES WITH MD5 ALGORTHIM

3DES encrypts a 64-bit block of plaintext to 64-bit block of cipher text. It uses 128-bit key. The algorithm consists of eight identical rounds and a "half" round final Transformation. There are 216 possible 16-bit blocks: ,. Each operation with the set of possible 16-bit blocks is an algebraic group. Bitwise XOR is bitwise addition modulo 2, and addition modulo 216 is the usual group operation. Some spin must be put on the elements – the 16-bit blocks – to make sense of multiplication modulo 216 + 1, however. 0 is not an element of the multiplicative group

all File Reci	sver		E	100	C-VORON.	
	Select Receiving Path					Local Local
	Start Server	Wer Key Receiver				- Long and a second
Your IP: 15	12.168.2.4					
File receiving Server Statu	path: C:\Documents and Settings\Prashb\Des Running and waiting to receive file.	ktop				
(Pharewolf and the	demand assessment to and to man. 91	50200				
	Transa					1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1
**	[편] [편] 🥒	C keyin and Database FileNam	Encrypted File	Decrypt Data		Key:
(Ntosilitor/illication	III Form1					FileName:
International D	Secure Data R	etrieval in Millitar	y Network	s		
æ	File Name: Exparagilist	192.168.2.4	Enter IP: 1	92 168 2 4	Submit IP	
Quick Heal	welcome parag			-	Remarks	
Secure browse					Litonat	and the second
benefit strengthere benefit					Encrypt	
DShitopupitxt					Unload	and the second second second second
						and the second sec
buddha_ph						State of the second second
and the second se						
and the second se				1		Set and the set of the
	Present Status Idle	Decument 1 - Microsoft Wa	न	2		

FIGURE3. SECURED DATA RETRIEVAL SYSTEM

Confidentiality: In order to protect sensed data and communication exchanges between sensor nodes it is important to guarantee the secrecy of messages. In the sensor network case this is usually achieved by the use of symmetric cryptography as asymmetric or public key cryptography in general is considered too expensive. However, while encryption protects against outside attacks, it does not protect against inside attacks/node compromises, as an attacker can use recovered cryptographic key material to successfully eavesdrop, impersonate or participate in the secret communications of the network. Furthermore, while confidentiality guarantees the security of communications inside the network it does not prevent the misuse of information reaching the base station. Hence, confidentiality must also be coupled with the right control policies so that only authorized users can have access to confidential information.

Integrity and Authentication: authentication is necessary to enable sensor nodes to detect modified, injected, or replayed packets. While it is clear that safety-critical applications require authentication, it is still wise to use it even for the rest of applications since otherwise the owner of the sensor network may get the wrong picture of the sensed world thus making inappropriate decisions. However, authentication alone does not solve the problem of node takeovers as compromised nodes can still authenticate themselves to the network. Hence authentication mechanisms should be "collective" and aim at securing the entire network. In particular, the following requirements must be supported by the key management scheme, in order to facilitate data aggregation and dissemination process: First we focused on the establishment of trust relationship among wireless sensor nodes, and presented a key management protocol for sensor networks. The protocol includes support for establishing four types of keys per sensor node: individual keys shared with the base station, pair wise keys shared with individual neighbouring nodes, cluster keys shared with a set of neighbours, and a group key shared with all the nodes in the network. We showed how the keys can be distributed so that the protocol can support in-network processing and efficient dissemination, while restricting the security impact of a node compromise to the immediate network neighbourhood of the compromised node. Applying the protocol makes it really hard for an adversary to disrupt the normal operation of the network.

VI. RESULT & ANALYSIS

	nidow kolaness (1924/092)			
in. Mai Enter S	Cour Key BOTTLION39	Servit Key	Browse Crepting Pile	Kay Pictame
beritopop tet	File Name: E-Vprint at bi	192.168.2.4 Ke	tor IP: 192,160,2.4	Sudard IP Flowson Enersyst Typhond
a sub constant	Present Status File transferred.	Document1 - Microsoft Word		TRANSFER AND TRANS

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be considered to be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective. The implementation stage involves careful planning, investigation of the existing system and it's constraints on implementation, designing of methods to achieve changeover and evaluation of

changeover methods. We categorize three causes for sensitive data to appear on the outbound traffic of an organization, including the legitimate data use by the employees. Case I Inadvertent data leak: The sensitive data is accidentally leaked in the outbound traffic by a legitimate user. This paper focuses on detecting this type of accidental data leaks over supervised network channels. Inadvertent data leak may be due to human errors such as forgetting to use encryption, carelessly forwarding an internal email and attachments to outsiders.

Formally defined and achieved with provable security. Experimental results show that our approach is sufficiently efficient for real-world applications. To support efficient handling of multiple auditing tasks, we further explore the technique of bilinear aggregate signature to extend our main result into a multi-user setting, where can perform multiple auditing tasks simultaneously. Extensive security and performance analysis shows the proposed schemes are provably secure and highly efficient. We also show how to extent our main scheme to support batch auditing for upon delegations from multi-users.



VII .CONCLUSION

The corresponding attribute group keys are updated and delivered to the valid attribute group members securely (including the user). In addition, all of the components encrypted with a secret key in the cipher text are encrypted by the storage node with a random , and the cipher text components corresponding to the attributes are also encrypted with the updated attribute group keys. Even if the user has stored the previous cipher text exchanged before he obtains the attribute keys and the holding attributes satisfy the access policy, he cannot decrypt the pervious cipher text.

VIII .FUTURE WORK

Misuse detection refers to techniques that use patterns of known Clones e.g., more than three consecutive failed logins or weak spots of a system (e.g., system utilities that have the "buffer

overflow" vulnerabilities) to match and identify Clones. The sequence of attack actions, the conditions that compromise a system's security, as well as the evidence (e.g., damage) left behind by Clones can be represented by a number of general pattern matching models. The key advantage of misuse detection systems is that once the patterns of known Clones are stored, future instances of these Clones can be detected effectively and efficiently. However, newly invented attacks will likely go undetected, leading to unacceptable false negative error rates.

REFERENCES

[1] Hiroki Nishiyama, Desmond Fomo, Zubair Md. Fadlullah,, and NeiKato,Fellow," Traffic Pattern Based Content Leakage Detection for Trusted Content Delivery Networks" IEEE Transaction on Parallel and Distributed System, Volume 25, No 2 Feb 2014

[2] K. Ramya, D. RamyaDorai, Dr. M. Rajaram "Tracing Illegal Redistributors of Streaming Contents using Traffic Patterns" IJC A 2011

[3] A. Asano, H. Nishiyama, and N. Kato, "The Effect of Packet Reordering and Encrypted Traffic on Streaming Content Leakage Detection" Proc. Int'l Conf. Computer Comm. Networks (ICCCN '10), pp. 1 6, Aug. 2010.

[4] Y. Chu, S.G. Rao, S. Seshan, and H. Zhang, "Enabling Conferencing Applications on the Internet Using an Overlay Multicast Architecture," Proc.ACM SIGCOMM, pp. 55 67, Aug. 2010

[5] O. Adeyinka, "Analysis of IPSec VPNs Performance in a Multimedia Environment," Proc. Fourth Int'l Conf. Intell igent Environments, pp. 25 - 30, 2008

[6] M. Dobashi, H. Nakayama, N. Kato, Y. Nemoto, and A. Jamalipour, "Traitor Tracing Technology of Streaming Contents Delivery Using Traffic Pattern in Wired/Wireless Environments," Proc. IEEE Global Telecomm. Conf., pp. 1 5, Nov./Dec. 2006.

[7] S. Amarasing and M. Lertwatechakul, "The Study of Streaming Traffic Behavior," KKU Eng. J., vol. 33, no. 5, pp. 541 553, Sept./Oct. 2006.

[8] R.S. Naini and Y. Wang, "Sequential Traitor Tracing," IEEE Trans. Information Theory, vol. 49, no. 5, pp. 1319 1326, May 2003.

[9] D. Geiger, A. Gupta, L.A. Costa, and J. Vlontzos, "Dynamic Programming for Detecting, Tracking, and Matching Deformable C ontours," Proc. IEEE Trans. Pattern Analysis and Machine Intelligence, vol. 17, no. 3, pp. 294 302, M ar. 1995

To Compare the Fresh and Hardened State Properties of Self Compacting Concrete Produce By Using Fresh & Recycled Aggregates

Avanish kumar¹, R.C. PATIL², JIJI M THOMAS³

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- <u>erakn20@gmail.com</u>
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>rcpmecivil@gmail.com</u>
 ³ ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>ijjimthomas020@gmail.com</u>

ABSTRACT

A self-compacting concrete (SCC) is the one that can be placed in the form and can go through obstructions by its own weight and without the need of vibration. The major advantage of this method is that SCC technology offers the opportunity to minimize or eliminate concrete placement problems in difficult conditions. It avoids having to repeat the same kind of quality control test on concrete, which consumes both time and labour. Construction and placing becomes faster & easier. It eliminates the need for vibration & reducing the noise pollution. It improves the filling capacity of highly congested structural members.

SCC provides better quality especially in the members having reinforcement congestion or decreasing the permeability and improving durability of concrete. The primary aim of this study is to explore the feasibility of using SCC along with the fibres and to check is using fibre in self compacting concrete is beneficial in terms of strength or not. An extensive literature survey was conducted to explore the present state of knowledge on the durability performance of self-consolidating concrete. However, because it usually requires a larger content of binder and chemical admixtures compared to ordinary concrete, its material cost is generally 20-50% higher, which has been a major hindrance to a wider implementation of its use. There is growing evidence that incorporating high volumes of mineral admixtures and micro fillers as partial replacement for Portland cement in SCC can make it cost effective. However, the durability of such SCC needs to be proven.

This research work consists of:

- i) development of recycled aggregates from Construction and demolition waste
- ii) Development of a suitable mix for SCC that would satisfy the requirements of the plastic state.
- iii) casting of concrete samples(CUBES & BEAMS) using recycled aggregates
- iv) casting of concrete samples(CUBES & BEAMS) using conventional aggregates
- v) Comparing the fresh state and hardened state properties of concrete samples.

The significance of this work lies in its attempt to provide some performance data of S.C.C using both fresh and recycled aggregates and to compare the fresh and hardened properties so as to draw attention to the possible use of recycled aggregates.

Keywords: Recycled aggregate, self-compacting, strength, permeability, alkalinity

1.Introduction

Self-compacting concrete (SCC) is a flowing concrete mixture that is able to consolidate under its own weight. The highly fluid nature of SCC makes it suitable for placing in difficult conditions and in sections with congested reinforcement. Use of SCC can also help minimize hearing-related damages on the worksite that are induced by vibration of concrete. Another advantage of SCC is that the time required to place large sections is considerably reduced.



Fig.-1 Necessity for self compacting concrete

When the construction industry in Japan experienced a decline in the availability of skilled labour in the 1980s, a need was felt for a concrete that could overcome the problems of defective workmanship. This led to the development of self-compacting concrete, primarily through the work by Okamura. A committee was formed to study the properties of self-compacting concrete, including a fundamental investigation on workability of concrete, which was carried out by Ozawa et al. at the University of Tokyo. The first usable version of self-compacting concrete was completed in 1988 and was named "High Performance Concrete", and later proposed as "Self Compacting High Performance Concrete".

Self-compacting concrete offers a rapid rate of concrete placement, with faster construction times and ease of flow around congested reinforcement. The fluidity and segregation resistance of SCC ensures a high level of homogeneity, minimal concrete voids and uniform concrete strength, providing the potential for a superior level of finish and durability to the structure. SCC is often produced with low water-cement ratio providing the potential for high early strength earlier remolding and faster use of elements and structures.

The elimination of vibrating equipment improves the environment on and near construction and precast sites where concrete is being placed, reducing the exposure of workers to noise and vibration. The improved construction practice and performance, combined with the health and safety benefits, make SCC a very attractive solution for both precast concrete and civil engineering construction.

In 2002 EFNARC published their "Specification & Guidelines for Self-Compacting concrete" which, at that time, provided state of the art information for producers and users. Since then,

much additional technical information on SCC has been published but European design, product and construction standards do not yet specifically refer to SCC and for site applications this has limited its wider acceptance, especially by specified and purchasers. In 1994 five European organizations BIBM, CEMBUREAU, ERMCO, EFCA and EFNARC, all dedicated to the promotion of advanced materials and systems for the supply and use of concrete, created a "European Project Group" to review current best practice and produce a new document covering all aspects of SCC. This document "The European Guidelines for Self Compacting Concrete" serves to particularly address those issues related to the absence of European specifications, standards and agreed test methods.

Mixture proportions for SCC differ from those of ordinary concrete, in that the former has more powder content and less coarse aggregate. Moreover, SCC incorporates high range water reducers (HRWR, super plasticizers) in larger amounts and frequently a viscosity modifying agent (VMA) in small doses. The questions that dominate the selection of materials for SCC are: (I) limits on the amount of marginally unsuitable aggregates, that is, those deviating from ideal shapes and sizes, (ii) choice of HRWR, (iii) choice of VMA, and (iv) interaction and compatibility between cement, HRWR, and VMA. The elimination of vibrating equipment improves the environment on and near construction and precast sites where concrete is being placed, reducing the exposure of workers to noise and vibration.

When structures made of concrete are demolished or renovated, concrete recycling is an increasingly common method of utilizing the rubble. Concrete was once routinely trucked to landfills for disposal, but recycling has a number of benefits that have made it a more attractive option in this age of greater environmental awareness, more environmental laws, and the desire to keep construction costs down.

Concrete aggregate collected from demolition sites is put through a crushing machine. Crushing facilities accept only uncontaminated concrete, which must be free of trash, wood, paper and other such materials. Metals such as rebar are accepted, since they can be removed with magnets and other sorting devices and melted down for recycling elsewhere. The remaining aggregate chunks are sorted by size. Larger chunks may go through the crusher again. After crushing has taken place, other particulates are filtered out through a variety of methods including hand-picking and water flotation. Crushing at the actual construction site using portable crushers reduces construction costs and the pollution generated when compared with transporting material to and from a quarry. Large road-portable plants can crush concrete and asphalt rubble at up to 600 tons per hour or more.

References

- [1]. Hajima Okamura and Masahiro Ouchi (2003) "Self-Compacting Concrete", Journal of Advanced Concrete Technology, Vol. 1, No.1.
- [2]. Zoran Gridic, Iva Despotovic, Gordana Toplicic. Curcic (2008), "Properties of Self Compacting Concrete with different types of additives", FactaUniversitaties, Series Architecture and civil Engineering, Vol.6, No. 2, PP 173-177.
- [3]. MD Noratan, HanizamAwang (2011), "The Compressive and Flexural Strength of Self Compacting Concrete using raw rice husk ash", Journal of Engineering Science and Technology, Vol. 6, No.6, PP 720-732
- [4]. Rahul Dubey, Pardeep Kumar (2012), "Effect of Super Plasticizer Dosage on Compressive Strength of Self Compacting Concrete", International Journal of Civil and Structural Engineering, Vol. 3, No. 2.

Application of Nanotechnology in Smart Civil Structures

Ravi Mishra¹, Prof. Rakesh Sakale², Prof. Kapil Sharma³

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- <u>ravimishra331@gmail.com</u>
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>rakesh_sakale@reddif.com</u>
 ³ ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>kapsha05@gmai.com</u>

Abstract

Nanotechnology has the potential to make construction faster, safer, cheaper and more varied, resulting in smart construction. Automation of nanotechnology construction can allow for the creation of structures from advanced homes to gigantic skyscrapers much more quickly and at much lower cost and higher efficiency. In the near future, Nanotechnology can be used to sense cracks in foundations of structures and can send nanobots to repair them. It can also provide self powered failure prediction and prevising mechanisms for high capital structures.

This paper explores the vision in making of smart and innovative infrastructure and leading a smart city with thehelp of application of nanotechnology in civil structures.

The study of nanoscience and various nanoparticles and their implementation in construction field is illustrated in this paper. The article further emphasizes more on the futuristic demand and application of nanotechnology in constructing smart structures. The paper is managed to be written in simple language for easy grasping.

Keywords: Civil Engineering, Nanotechnology, Nanoparticles, Smart-Construction.

INTRODUCTION

A. Civil Engineering

Civil engineering is always bounded within cement, sand, stone and aggregate, but it is way beyond that. It deals with innovation at each and every step of constructing a structure. After military engineering, the second oldest engineering discipline is none other than civil engineering. It is traditionally splintered into several sub-disciplines consisting of structural, architectural, geological, geotechnical, environmental, transportation, earthquake, water resources, quantity and construction surveying, municipal or urban and construction engineering.

B. Nanotechnology

The American physicist, Richards P. Feynman raised and put forward nanotechnology in his famous lecture at the California Institute of Technology in 1959. The word "Nano", which is evolved from the Greek word for dwarf, indicates a billionth. Nanotechnology is the use of minute particles of material either by themselves or by their manipulation to generate new large scale materials. The size of molecule, though, is very significant because at the length scale of the nanometer, 10-9 m, the properties of material affects considerably. A billionth of a meter corresponds to a single nanometer. It concerns with particles ranging between 1 to100 nanometer in size.

1 Nanometer (nm) = $1 \times 10-9$ m.

Nanotechnology is not a new science or technology, it is rather an augmentation of the sciences and technologies which already exist from many years and it is logical progression of the work that has been done to analyze the nature of our world at an even smaller scale.

C. Need of Nanotechnology in construction

Nanotechnology has changed and will pursue to change our perception, expectations and abilities to control the materials world. Several applications have been developed for this specific sector to improve the energy efficiency, durability of construction elements, and safety of the buildings, delivering the ease of maintenance and to provide increased living comfort. The role of nanotechnology in conceiving of innovative infrastructure systems has the potential to transform the civil engineering practice and dilate the vision of civil engineering. Many disciplines of civil engineering, in conjunction with design and construction processes can be benefited from this technology. For example, new structural materials with unique properties, stronger and lighter composites, sound absorber, fire insulator, low maintenance coating, nano-clay filled polymers, self-disinfecting surfaces, water repellents, air cleaners, nano sized sensors, solar cells, ultra thin-strong-conductive wafers etc. This article introduces, in brief, the areas of application of this technology in civil engineering and the science & technology behind the improved performance.

D. Application of nanotechnology in smart construction

The following table exhibits some of the nanoparticles and their relevant application areas in the field of construction industry.

Sr.no.	Nanoparticles	Application areas
1.	Nano-silica (SiO2)	Replaces part of the cement to densify the
		concrete and gain early strength
2.	Slurry of amorphous nano- SiO2	Improves segregation resistance in self compacting concrete (SCC)
3.	Oxidized multi-walled nanotubes (MWNT)	Increase compressive strength and flexural strength in concrete
4.	Micro encapsulated healing polymer (smart material)	Micro encapsulated healing polymer (smart material) Automatically closes the cracks in concrete when they occur
5.	Shewanella micro- organism at nano scale, concentration of 105 cells/ml	25% increased compressive strength in concrete
6.	Polymer fibre matrix using nanosilica	Self Structural Health Monitoring system in Repairs & Rehabilitation
7.	Low carbon, high performance steel using copper nanoparticles	In bridges for corrosion resistance & better weld ability

8.	Fumed silica nanoparticles Fire	protective glass
9.	Nanosized Titanium dioxide (TiO2), bimetallic nanoparticles	Anti- reflection coatings for glasses, self- cleaning windows, durable paints, anti-graffiti coatings, anti-bacterial coatings and thermal control, water repellant structures, carpets, protective clothing, reflect & transmit light in different wavebands
10.	Nanotechnology enabled sensors (Nano & Micro electricalmechanical systems)	To monitor and control temperature, moisture, smoke, noise, stresses, vibrations, cracks and corrosion
11.	Electronic noses based on an arrangement of different polymer nanometre-thin film sensors, disposable chips, built in chemical sensors	Monitor water quality & send pollution alerts by radio, smart aggregate in concrete
12.	Nano-porous silica compounds with embedded organic molecules	Superior Insulating characteristics at optimum energy efficiency
13.	Carbon nanotubes along with atmospheric plasma	Light weight fibre reinforced plastics (FRP) with good electrical and heat resistant properties
14.	Nanorod polymer sand wiched between two electrodes	Plastic solar fuel cells with photo voltaic properties
15.	Organically modified bentonite asphalt	Road construction with more durability
16.	Nanotechnology + Biomimetic Science	Provide equivalence between artificial and natural construction materials

FUTURISTIC IMPLEMENTATION OF NANOTECHNOLOGY

A. Superhydrophobic coating in construction material

A superhydrophobic surface, initially observed from lotus leaves has attracted scientific interest. It has been known that a fusion of surface roughness at both the nano and microscale combined with a low surface energy of the matter is the key to superhydrophobicity and ice repellent. In last few years, research efforts have been

made in the development of super repellent materials and surfaces targeting a wide range of applications, from water-proof, anti-ice and anti-fouling coatings, self-cleaning utensils etc.
Presently, there is much concern in the use of polymer as nanoscale modifiers of the surface properties of traditional asphaltic materials.

1. Concrete

Concrete, a composition of portland cement as binder and water as well as aggregates as fillers, is a porous material with pores ranging in size from millimeters to nanometers. In most applications concrete surface is subjected to external abrasion, environmental exposure and erosion to aggressive liquids, such as water,

mineral solutions, oil, solvents, etc. When dry concrete deals with liquid such as water, most of the water is absorbed by the pores due to the capillary forces. The durability (i.e. freeze-thaw and sulfate attack) of concrete depends on its overall absorption and porosity to aqueous solutions. For example, freeze-thaw damage occurs when water in saturated concrete freeze due to temperature variations causing substantial stresses within the material. The cumulative effect of freeze-thaw cycles eventually cause cracking, crumbling, expansion and scaling of the concrete. It is therefore crucial to synthesize water-repellent concrete in order to improve its durability, and, in particular, to produce the ultra-durable concrete.

The following image clears our view about the settlement of water or any other liquid media on both, the coated and non-coated concrete.

Built-up of snow and formation of ice on paved regions of roadways or airfields can create critical problems resulting in huge traffic, economical loss and endangering passenger safety.



2. Brick

Brick is a versatile component in the field of architectural and construction engineering. It is composed of cement, sand, water, lime and claybearing soil. Some of the properties such as hardness, absorption, compressive strength, frost resistance, efflorescence etc vary from brick to brick depending upon the type of brick, namely, common burnt clay bricks, sand lime bricks, fly ash clay bricks, engineering bricks etc. The different categories of bricks are manufactured so that it must fulfill the respective purpose. Water is a component that can be hazardous to any structure, if surplus in existence. Likewise if water comes to contact of bricks where not needed can affect the properties of bricks negatively and can prove to destroy the bricks and so the structure where the bricks are used.

To overcome this problem, water repellent is introduced in the form of hydrophobic coating. The hydrophobic coating of brick helps it to repel the unwanted water and to retain the strength, durability, toughness, hardness and other physical properties.



The following image shows the importance and working of hydrophobic coating on bricks. Hydrophobic coating can be applied to the bricks underlying the hard strata in the formation of foundation where ground water can prove to be harmful agent. Houses made up of brick masonry can be coated with hydrophobic coating so as to prevent the bricks from environmental pollution and natural calamities. To minimize the loss of water from wells or ponds In this way hydrophobic coating can help the brickwork in construction. Thus, to overcome such substantial problems, application of hydrophobic coating can be proposed to construct smart-structures leading a better civil life.

B. The thirsty concrete (Topmix Permeable concrete)

Background:

When water strikes the Topmix Permeable concrete, it doesn't flow in all directions, slicking up the surface. It flows only in downward direction and it disappears almost instantly. Traditional concrete has to be permeable enough to let at least 300 millimeters of water per hour through the ground level. Topmix Permeable, in contrast, accommodates 36,000 millimeters of water an hour, or approximately 880 gallons every minute. This disappeared water adds up in the water below earth's surface. Tarmac, a UK building materials and solutions company generated Topmix Permeable to divert rainwater during storms.

Applications:

1. It allows handling safely a major storm event every 100 years.

2. It can be used on the railway tracks for smooth running of trains in rainy season without any delay.

3. It can be proposed on the runways for ease in take off and landings.

4. It can be introduced on the roadways and highways for better transportation.

The formation of Topmix Permeable concrete is

illustrated in the above image.





Conclusion

The idea of the presented review paper volves around the implementation of nanotechnology in building a smart and efficient infrastructure. It reveals the utmost need of application of this technology in the field of construction for sustainable development.

Various nanoparticles and their application areas in construction of smart structure for leading a smart city and setting a positive impact on environment have been discussed

in this review paper. The article further emphasizes more on the futuristic implementation of nanotechnology and gives an idea on applying the concept of superhydrophobic coating and water absorbing concrete in construction industry for the development of smart city leading to smart nation.

In short, this paper concludes with a strategic plan on how civil engineering can be benefited with the implementation of nanotechnology resulting in construction of smart structures.

References

 [1] Mann, S. (2006). "Nanotechnology and Construction," Nanoforum Report. www.nanoforum.org, May 30, 2008.
[2] Beatty, C. (2006). "Nanomodification of asphalt to lower construction temperatures." NSF Workshop on Nanotechnology, Material Science and Engineering, National Science Foundation, Washington, DC.

[3] ASCE. (2005). "Report card for America's infrastructure. American society of civil engineers" "http://www.asce.org" (Mar. 8, 2008).

[4] Bartos, P. J. M. (2006). "NANOCONEX Roadmap-novel materials." Centre for Nanomaterials Applications in Construction, Bilbao, Spain "http://www.mmsconferencing.com/nanoc/" (Jan. 13, 2008).

[5] Shah, S. P., and A. E. Naaman. "Mechanical Properties of Glass and Steel Fiber Reinforced Mortar." ACI Journal 73, no. 1 (Jan 1976): 50-53.

[6] Saafi, M. and Romine, P. (2005)."Nano- and Microtechnology." Concrete International, Vol. 27 No. 12, p 28-34. [7]Sandvik Nanoflex Materials Technology. http://www.smt.sandvik.com/nanoflex, May 30, 2008.

Review Paper Of Variables That Effect Service Life Of Concrete

Structure

Waseem Khan¹, Aslam Hussain², Hirendra Pratap Singh²

 ¹ Phd Research Scholar, UIT R.G.P.V. M.P. BHOPAL Email id- <u>wkrgpv@gmail.com</u> 2(Civil, UIT R.G.P.V Bhopal, M.P,India)
³ Asst. Prof. Department Of Civil Engg.,Sort (People's University) Bhopal Email id – <u>hirendra.rajput2000@gmail.com</u>

Abstract

In this paper we have literature survey on factor that reduce the life of concrete structure.as we know about that, In Indian due to urbanization has demanded more and more consumption of concrete. There are various influences to increase the durability and strength of concrete.

Introduction

Concrete drive its strength by the hydration aspect of cement particles The hydration of cement is not a momentary action but a process continuing for a long time .The rate of hydration is fast to start with ,but continues over a very long time at a decreasing rate .The quantity of the product of hydration and consequently the It is seen that practically a water/cement ratio of 0.5 will be required for complete hydration in sealed container for keeping up the desirable relative humidity level.

In the field and actual work, it is a different story, Even though a higher water cement ratio ids used since the concrete is pen to atmosphere, the water used in concrete evaporates and the water available in the concrete will not be sufficient for effective hydration to take place particularly in the top layer. If the hydration is to continue unbated, extra water must be added to replace the loss of water from the surface of the concrete. There for curing can be considered as a creation of favorable environment during the early period for uninterrupted hydration .the desirable condition are a suitable temperature and ample moisture (CONCRETE TECNOLOGY,M.S.SHETTY). Review of research work on influence of concrete durability are listed below.

R. Alizadeh1; P. Ghods2; M. Chini3; M. Hoseini4; M. Ghalibafian5; and M. Shekarchi6 et-al:

With the exception of continuously water-cured samples, no apparent effect of age on the porosity and pore sizes was seen when comparing the 6-month-old samples with the 18-monthold samples. Storing the samples in air both indoors and outdoors results in loss of internal moisture. In addition to the relatively small dimensions of the samples, such loss of moisture is accelerated because all faces of the samples are exposed to air. Therefore, no significant hydration of the cementitious materials may be expected in samples stored in air after initial water-curing periods. This observation is seen valid for all types of cement. However, continuous water curing reduced significantly the total porosity of all mixes in the range of 8–20% because of the continuous availability of moisture when comparing the 18-month-old samples with those tested at 6 months. The maximum effect is seen again for mix E (with highest total cementitious content)

Longer curing durations reduce porosity and result in finer pore structure. This is particularly important for concrete directly exposed to ambient environments. Lack of early water curing resulted in significant detrimental effects on porosity and pore structure characteristics.

This was very apparent in the hot/dry environments in which these tests were carried out.

Higher slag content has an adverse effect on the characteristic of pore structure if concrete is left without any water curing at all.

The use of slag as a cement replacement material improved the characteristics of the pore structure when appropriate water curing was carried out. Porosity and pore structure are adversely affected by external exposure conditions.

Ming-Ju Lee1, Ming-Gin Lee2, Yu-Min SU3, Wei-Kai Hsu4 et-al: In this study, cement mortar and concrete were used to investigate some accelerated curing on the strength and chloride electrical penetration of concrete.

In order to evaluate some rapid testing procedures which could run a series of tests within one day to attain an estimate of the 28-day strength of the concrete, specimens with microwave heating in different hydration stages were tested on compressive strength and chloride electrical penetration. The initial result was found that the accelerated curing on fresh mortar or concrete samples which combines steam curing and microwave heating could increase strength successfully within one day. Some accelerated curing samples could reach 7-day compressive strength and the others could reach 28-day compressive strength. It was found that the 28-day chloride electrical penetrability of the accelerated curing samples reduce greatly when curing them in water after the accelerated curing. It makes a contribution to the denseness of microstructure and reduces the chloride electrical penetrability. The steam and microwave techniques could provide the advantage of quick and uniform heating for curing of cement mortar and concrete.

The main findings from this study are summarized as follows:

(1) The 1-day strength results show that the higher curing temperature and longer curing time produced higher early strength for all mortar mixes.

(2) The mortar test results indicated that microwave heating could further increase the compressive strength of the mortar. The mortar

samples which combine 7-hour steam curing at 75°C plus 40-minute microwave heating had a high percent strength development.

(3) High early compressive strength of the steam and microwave cured mortar or concrete was obtained while its 28-day strength was slightly lower than the 28-day strength of normally water-cured ones.

(4) The early strength development due to microwave heating appears to level off after 40 minutes of microwave heating. Thus, a 40-minute microwave heating may be the optimum length of time for energy saving consideration.

(5) The 28-day chloride electrical penetrability of the accelerated curing samples reduces greatly when curing them in water after the accelerated curing. It makes a contribution to the denseness of microstructure and reduces the chloride electrical penetrability.

Zhi-Min HE 1 Feng XING 2 Zhu DING 3 et-al:

Water absorption is closely related to the durability of concrete. To determine the effect of steam curing on water absorption of concrete at early ages, this paper investigated the water absorption of concrete which had different compositions of cementitious materials under three types of technological measures condition (technology A, B and C), and performed water absorption comparisons of various types of concrete by cutting the specimens into three slices: top-level,

internal, and bottom. Results indicate that the water absorption of all specimens appears to be gradient distribution from top-level to bottom, and top-level specimens have the highest water absorption. However, in terms of water absorption, there is no significant difference among the other layers. The highest water absorption value is achieved by the top-level of concrete with technology A, which is 42% higher than that of its mid-level. However, the water absorption of top-level, mid-level, and bottom layer of various concretes with technology B and C are all decreased, especially the concretes incorporating admixture A with technology C.The differential value of water absorption between the top-level and mid-level is 3%~18% commonly. By use of suitable technological measures and admixtures, the harm of steam curing on the surface structure of concrete will be alleviated, and the inhomogeneity of the internal concrete can be improved

The following conclusions are drawn from the results of this investigation on the water absorption of steam-cured concretes. For the same mix of steam-cured concrete, the highest water absorption value and differential value are achieved by the concrete with technology A. By using technology B and C, the damaging effect of steam curing temperature on the top-level of steam-cured concrete will be alleviated, as well as the inhomogeneous concrete internal structure. In this paper, the top-level water absorption value of steam-cured concrete is significantly decreased by using technology C. The influence of curing temperature on steam-cured concrete may be mainly in the vicinity of concrete surface. For improving the quality of concrete, the effect of technology B and C would be mainly near the concrete surface and would reduce the top-level water absorption value of steam-cured concrete water absorption, and thus the durability of concrete under steam curing conditions.

By David N. Richardson, et-al: This paper summarizes the many variables that can affect the measured compressive strength of concrete cylinders. The paper includes the whole testing process: sampling, casting, initial curing, transporting, laboratory curing, capping, and testing. Most nonstandard techniques render lower measured strengths, some by as much as 75%. Improper specimen casting techniques that can cause

significant measured strength losses include insufficient consolidation effort or inappropriate consolidation technique, use of flexible wall molds, especially if mistreated, and poor cylinder end conditions (even if capped properly). Initial job site curing conditions can render low results. Problems can occur from low or high temperatures, insufficient moisture, and disturbance. Rough handling during cylinder transport can lower measured strengths. Use of improper capping material sand techniques are some of the worst mistakes, and include overly used capping material and non plane end cap surfaces. Improper load testing techniques that are significant include inappropriate specimen moisture content at time of testing, misalignment

of specimen in the load frame, and inaccurate machine calibration. Discussion of machine characteristics is included. Post failure inspection of specimens and reporting techniques are recommended.

N. R. Shattaf,1 A. M. Alshamsi,2 and R. N. Swamy3 et-al: The overall aim of this paper is to investigate the effect on pore structure of concretes exposed to hot and dry environments and made with combinations of portland cement, silica fume, and slag. Five different concrete mixes were cast and tested to investigate the role of different periods of water curing on the porosity and pore structure characteristics when exposed to two different hot/dry environments. The first

environment was an indoor laboratory (237C 1 27C and 70% relative humidity 1 10%) and the other was the real outdoor environment in Dubai, representing a typical hot climate. Pore structure was evaluated by means of mercury intrusion poro simetry. The results indicated that longer water durations of water curing reduced porosity and pore sizes significantly. The influence of water curing was maximum in the case of slag mixes cured in the outdoor environment. Hot climates are seen to have adverse effects on the pore structure characteristics, especially when no water curing is involved. The properties of slag concrete were seen to be a function of duration of water curing. The properties of slag concrete mixes exposed to hot/dry environments without any water curing were very poor.

N. N. Khoury1 and M. M. Zaman2 et-al:

The present study focuses on investigating the effect of freeze-thaw _FT_ cycles, referred to as environmental effect in this paper, on aggregates stabilized with various stabilizing agents, namely, cement kiln dust _CKD_, Class C fly ash _CFA_, and fluidized bed ash _FBA_. Cylindrical specimens were compacted and cured for 28 days in a moist room with a constant temperature and controlled humidity. After curing, specimens were subjected to 0, 8, 16, and 30 FT cycles, and then tested for resilient modulus _*Mr*_. Results showed that *Mr* values of stabilized specimens decreased with increasing FT cycles up to 30. The reasons for such changes are explained by the increase in moisture content during thawing and the formation of ice lenses within the pores during freezing, causing distortion of the matrix of particles. It was also found that the decrease in *Mr* values varied with the type of stabilizing agents. The CKD-stabilized Meridian and Richard Spur aggregates exhibited a higher reduction in *Mr* values than the corresponding values of CFA- and FBA stabilized specimens. The CFA-stabilized Sawyer specimens performed better than their CKD- and FBA-stabilized counterparts.

B. B. Das1 and S. P. Pandey2 et-al:

The paper presents an investigation on the influence of the fineness of fly ash on the carbonation and electrical conductivity of concrete. Fly ash collected from three thermal power stations in India (with a Blaine's fineness of 200, 255, and 305 m2=kg, respectively) were used for this study. The study also involved three replacement levels (15, 25, and 35% of cementitious materials) for each fly ash sample.

Accelerated carbonation studies were performed on specimens cured for 3, 7, and 28 days. The electrical conductivity of concrete was evaluated by measuring the charge passed in coulomb (per ASTM C1202) on 28-day-cured specimens. The test results indicated that the carbonation depth of concrete increased as fly ash replacement increased. However, the carbonation resistances of concrete increased with increased fly ash fineness. Furthermore, the carbonation resistance of concrete increased significantly with a prolonged curing time. The coulomb charge passed through the concrete at an age of 28 days was significantly reduced with the incorporation of fly ash, and the magnitude of reduction increased with increased in fly ash fineness and replacement level.

Sean Monkman1 and Yixin Shao2 et-al:

Early age carbonation curing of slag-cement concrete was investigated to assess the feasibility of binding CO2 in slag-cement building products while improving their short-term and long-term performances. Four binder types were compared: an ordinary Portland cement; an 85/15 slag cement; a 75/25 slag blend; and a 50/50 slag blend. A 2-h carbonation-curing treatment allowed concretes to bind 8–10% CO2 by mass of binder and attain as much as 82% of the 24-h hydration strength. The subsequent strength development of carbonated concrete was slower in the first 24

h possibly due to the carbonate buildup, but it was comparable to the conventionally hydrated concrete after 28 days. The carbonated concrete was shown to have a fracture toughness comparable to that of the hydrated concrete. The freeze/thaw durability of the concrete in deicing salt solution was vastly improved by the carbonation treatment. The pH of the carbonated concrete was reduced but was still above the threshold level required for the passivation of iron. The use of slag in carbonation curing is beneficial to strength gain, shrinkage reduction, and deicing salt resistance.

Conclusion

On the basis of above literature Carbonation curing is different from weathering carbonation in that the former is applied at a very early age while the latter occurs in matured concrete. This research aims to investigate carbonation curing as a way of simultaneously binding carbon dioxide into slag-cement concrete products and improving their performance. The carbonation curing of concrete products allowed for significant binding of CO2 while improving the properties of the concrete. The absorption of carbon dioxide, by mass of binder, was approximately 8–10%. The carbonation treatment gave the concrete strength within 2 h that was more than 70% of the 24-h hydration strength. The strength gain of carbonated concrete was, however, slower beyond 24-h additional hydration possibly due to the carbonate buildup. Longer subsequent hydration resulted in carbonation treatment of the 50/50 blend concrete reduced the cementitious nature of the slag. The fracture toughness's of the carbonated and hydrated concretes were comparable when tested after 120 days of hydration. The carbonation treatment enormously improved the freeze/thaw durability. pH values of the carbonated concrete has reduced but still above the level required for the passivation of iron.

References

- [1]. R. Alizadeh1; P. Ghods2; M. Chini3; M. Hoseini4; M. Ghalibafian5; and M. Shekarchi6 (2007), Effect of Curing Conditions on the Service Life Design of RC Structures in the Persian Gulf Region. JOURNAL OF MATERIALS IN CIVIL ENGINEERING © ASCE / JANUARY 2008.
- [2]. Ming-Ju Lee1, Ming-Gin Lee2, Yu-Min SU3, Wei-Kai Hsu4, ASCE (2014), Experimental Study of Applying Steam and Microwave Technology for Fresh Concrete Curing. Advanced Characterization of Asphalt and Concrete Materials 36 GSP 255 © ASCE 2014.
- [3]. Zhi-Min HE 1 Feng XING 2 Zhu DING 3 (2010), Water Sorptivity of Steam Cured Concrete For Railway Precast Elements at Early Ages. ICCTP 2010: Integrated Transportation Systems— 3082 Green•Intelligent•Reliable © 2010 ASCE
- [4]. By David N. Richardson,1 Member, ASCE (2013) review of variables that influence measured concrete compressive strength. J. Mater. Civ. Eng. 1991.3:95-112.
- [5]. N. R. Shattaf,1 A. M. Alshamsi,2 and R. N. Swamy3(2015) curing/environment effect on pore structure of blended cement concrete. JOURNAL OF MATERIALS IN CIVIL ENGINEERING © ASCE / JANUARY 2008.
- [6]. N. N. Khoury1 and M. M. Zaman2 (2007)Environmental Effects on Durability of Aggregates Stabilized with Cementitious Material, JOURNAL OF MATERIALS IN CIVIL ENGINEERING © ASCE / JANUARY 2007
- [7]. B. B. Das1 and S. P. Pandey2 (2011), Influence of Fineness of Fly Ash on the Carbonation and Electrical Conductivity of ConcreteJOURNAL OF MATERIALS IN CIVIL ENGINEERING © ASCE / SEPTEMBER 2011 / 1365.
- [8]. Sean Monkman1 and Yixin Shao2 (2015), Carbonation Curing of Slag-Cement Concrete for Binding CO2 and Improving Performance, JOURNAL OF MATERIALS IN CIVIL ENGINEERING © ASCE / APRIL 2010 / 297.

The Effect of Using Waste Glass and Waste Plastic Material on the Asphalt Pavement Properties

Vivek Singh ¹ Rakesh Sakale ² R.C. Patil³

 ¹ M.TECH (CTM) Student, Civil Engg. ,SORT (People's University) Email id- <u>singh.vivek1291@gmail.com</u>
². PROF. Department Of Civil Engg.,SORT (People's University) Email id – <u>rakesh_sakale@reddif.com</u>
³ASST. PROF. Department Of Civil Engg.,SORT (People's University) Email id – <u>rcpmecivil@gmail.com</u>

Abstract

In India, flexible pavements with bituminous surfaces are widely used. Bituminous mixes are most commonly used all over the world in flexible pavement construction. The present study aims for use of modified bitumen by using plastic and glass waste for road construction. Glass and plastics are widely used in our daily life. Waste glass and plastics has been used in the road construction as an alternative to the aggregates and bitumen in the hot asphalt mixes in many countries so as to guarantee the sustainable management of the wastes materials. To modify the performance of the bituminous concrete it was suggested to use the waste products like glass, plastic, rubber tires, fly ash, metal, concrete etc. in the asphalt concrete. Recycling is considered to be one of the most important bases of sustainability. Waste glass has been used in the road construction as an alternative to the aggregates and waste plastic as a binder in the hot asphalt mixes in many countries. The research will study the effects of crushed waste glass as coarse sand and filler in the asphalt binder course and waste plastic as binder with bitumen on the properties of Marshall Hot Mix Asphalt.

Key words- Bituminous concrete (BC), Modified Bitumen concrete(MBC), Hot Mixed Asphalt(HMA), Marshall Stability Test.

1. Introduction- India is having second largest road network of over 4.6 lakh KM in the world. Due to extreme climatic conditions, growth of traffic and increasing maintenance expenditure on roads in India there is a necessity to develop sustainable technologies and economical road construction. The bituminous mix design aims to determine the proportion of bitumen, filler, fine aggregates, and coarse aggregates to produce a mix which is workable, strong, durable and economical. There are two types of the mix design, i.e. dry mix design and wet mix design. In general pavements are categorized into 2 groups, i.e. flexible and rigid pavement.

1.1 .1 Flexible Pavement

Flexible pavements are those, which on the whole have low flexural strength and are rather flexible in their structural action under loads. These types of pavement layers reflect the deformation of lower layers on-to the surface of the layer.

1.1.2 Rigid Pavement

If the surface course of a pavement is of Plain Cement Concrete then it is called as rigid pavement since the total pavement structure can"t bend or deflect due to traffic loads.

1.2 Requirements of bituminous mixes

Bituminous mixture used in construction of flexible pavement should have following Properties:

- 1. Stability
- 2. Durability
- 3. Flexibility
- 4. Skid resistance
- 5. Workability

Now-a-days, the steady increment in high traffic intensity in terms of commercial vehicles, and the significant variation in daily and seasonal temperature put us in a situation to think about some alternative ways for the improvement of the pavement characteristics and quality by applying some necessary modifications which shall satisfy both the strength as well as economical aspects. On the other hand, the successful use of waste glass as a constituent in asphalt concrete pavements has been shown to be technically feasible. Because the volume of aggregate needed for highway construction is so large, the use of waste glass for this purpose offers a potential for utilizing most, if not all, of the recycled glass unsuitable for other purposes.

1.3 Waste Plastic & Waste Glass: The problem

With the rapid economy growth and continuously increased consumption, a large amount of waste materials is generated. Today availability of plastic waste is enormous. The use of plastic materials such as carry bags, cups, etc is constantly increasing. Nearly 50% to 60% of total plastic are consumed for packing. Once used, plastic packing materials are thrown outside and they remain as waste. Plastic wastes are durable and non-biodegradable. The improper disposal of plastic may cause breast cancer, reproductive problems in humans and animals, genital abnormalities and much more. Waste glass is considered one of the most important parts of the collected waste materials, it is non metallic and inorganic, it can neither be incinerated nor decomposed, so it may be difficult to reclaim. Waste glass has been used in highway construction as an aggregate substitute in hot mix asphalt paving. In recent years, industrial wastes have been utilized in road construction in developing countries. The use of these materials in road making is based on technical, economic, and ecological criteria. Use of higher percentage of plastic waste reduces the need of bitumen by 10%. It also increases the strength and performance of the road. The polymer bitumen blend is a better binder compared to plain bitumen. When used for road construction it can withstand higher temperature. Hence it is suitable for tropical regions. This increases the surface area of contact at the interface and ensures better bonding between aggregate and bitumen. The polymer bitumen blend is a better binder compared to plain bitumen. Many highway agencies routinely allow glass to be used as a substitute for aggregate in asphaltic concrete pavements. The existence of crushed glass in the asphalt binder course mixture is considered as an eco-friendly material and it can be utilized as a sustainable management of waste glass. Many communities have recently incorporated glass into their roadway specifications, which could help to encourage greater use of the material. Glass is known for its insulating or heat-retention properties (low thermal conductivity). Aggregates and aggregate mixtures with low thermal conductivity can help to decrease the depth of frost penetration. Results for crushed glass with those for a natural gravelly sand aggregate mix

show that glass can be expected to exhibit higher heat retention than natural aggregate materials. The high reflective properties of glass can be a desirable property in highway construction. The management of these waste materials in a single application i.e. in Asphalt pavement with taking their extreme properties when constituted with the mix can enhance the quality of pavement and can also increase its future aspects in Highway construction.

2. Need of study

The aim of this research is to study the possibility of using crushed waste glass as coarse sand and filler materials and waste plastic as binder material in Asphalt Binder Course. The bituminous mix design aims to determine the proportion of bitumen, waste plastic, crushed waste glass as course sand and filler and, coarse aggregates to produce a mix which is workable, strong, durable and economical. A comparative study has been made in this investigation between MBC and BC mixes with varying binder contents (3.5% - 7%), polyethylene contents (0.5% - 2.5%) and glass as course sand and filler content(15%-20% by weight of total aggregate) having size not more than 4.75mm. The objectives of this investigation are to observe the followings:

- a) Study of Marshall properties of mixes using glass as filler and course sand.
- b) The effect of polyethylene as admixture on the strength of bituminous mix with different filler.
- c) The performance of bituminous mix under water with and without polyethylene admixture with different filler.
- d) To study resistance to permanent deformation of mixes with and without polyethylene.
- e) Finding useful application for waste glass and plastics as a part of the solution for environmental problems resulting from the disposal of waste material.
- f) Study the effect of adding different percentages of waste plastic and crushed glass on the properties of asphalt mix comparing it with conventional mix properties.
- 2.1 Present scenario- Since glass is known for its insulating or heat-retention properties and plastic have good binding nature which gives higher strength, higher resistance to water and better performance over a period of time. This study will have a positive impact on the environment as it will reduce the volume of plastic waste to be disposed off by incineration and land filling. It will not only add value to plastic and glass waste but will develop a technology, which is eco-friendly. Nowadays we can use plastic in road construction purpose. Plastic increases the melting point of the bitumen and makes the road retain its flexibility during winters resulting in its long life. Shredded plastic waste acts as a strong binding agent. Bituminous binders are widely used in road paving and their viscoelastic properties are dependent on their chemical composition. Now-a-days, the steady increment in high traffic intensity in terms of commercial vehicles, and the significant variation in daily and seasonal temperature put us in a situation to think about some alternative ways for the improvement of the pavement characteristics and quality by applying some necessary modifications which shall satisfy both the strength as well as economical aspects. Bitumen can also be modified by adding different types of additives to achieve the present requirement.

3. Material and method-

3.1 Materials:

Following material can be use for the study is as follows:

- 1. Aggregate(course)
- 2. Waste glass(as fine aggregate)
- 3. Bitumen
- 4. Waste plastic(as binder)
- **3.2 Method:** For investigating the properties of asphalt mix and to find out the suitability of using crushed waste glass and waste plastic in asphalt mixtures, an extensive experimental work would have to conduct. The Marshall stability and flow test provide the performance prediction measure for the Marshall mix design method. The stability portion of the test measure the maximum load carrying capacity by the test specimen at a loading rate of 50.8 mm/minute. Load will applied to the specimen till failure, and the maximum load will designated as stability. After that, with different bitumen contents asphalt mixes will prepare to obtain optimum bitumen content by marshall test. Then optimum bitumen content is used to prepare asphalt mixes with various percentages of plastic and glass content. Marshall Test is used to evaluate the properties of the asphalt mixes. And then test results will obtain and analyzed.

4. Methodology

For the performance of this experiment we have to perform several test according to the material used to check their physical properties and to make them useful for the experiment. So according to material chosen, there are some of the important test which we have to perform during the experiment:

4.1 Test on Bitumen:

- 1. Penetration test
- 2. Softening point test
- 3. Specific gravity test

4.2 Test on Agreegate:

- 1. Sieve analysis (retained over 4.75mm sieve)
- 2. Impact resistance value test
- 3. Los-angeles test

4.3 Test on Asphalt mix:

- 1. Marshall test
- 2. Stability, flow test
- 3. Void analysis

References

- [1]. Awwad M. T. and Shbeeb L (2007), "The use of polyethylene in hot asphalt mixtures", *American Journal of Applied Sciences, volume 4*, pp. 390-396.
- [2]. Fernandes M. R. S., Forte M. M. C. and Leite L. F. M. (2008), "Rheological evaluation of polymer-modified asphalt binders", *Journal of Materials Research, Volume 11*, pp. 381-386.
- [3]. Fulton, B 2008, 'Use of recycled glass in pavement aggregate', 23rd ARRB Conference Research Partnering with Practitioners, Adelaide, Australia.
- [4]. Diab, F, Saleh, S & El-burai, S 2010, '*Recycled glass and its applications in construction*', B.Sc graduation thesis, Islamic University of Gaza, Palestine.
- [5]. Attaelmanan M., Feng C. P. and Al A. (2011), "Laboratory evaluation of HMA with

- a. high density polyethylene as a modifier", *Journal of Construction and Building Materials, Volume 25,* pp. 2764–2770.
- [6]. Gawande A., Zamare G., Renge V.C., Tayde S. And Bharsakale G. (2012), "An overview on waste plastic utilization in asphalting of roads", *Journal of Engineering Research and Studies Vol. III/ Issue II.*
- [7]. Gautam, S, Srivastava V & Agarwal V 2012, 'Use of glass wastes as fine aggregate in Concrete', *Journal of Academic and Industrial Research*, Vol. 1(6).

Performance of short length batter pile in expansive soil under the floor

K G Kirar

HOD, Civil Department RIRT, Bhopal

Abstract

In this present study an attempt has been made to study the movement of floor laid over expansive soil on wetting. The soil sample from, Maulana Azad National Institute of Technology site at sports ground, Bhopal was collected for preparing the model room floor base. Basic laboratory test were performed on the soil to determine its physical and engineering properties including swelling characteristics.

The soil has liquid limit, plasticity index, differential free swell value and swelling pressure as 52%, 28%, 48.54%, 0.92kg/cm²

The experimental study was performed on a model concrete floor laid over expansive soil base. For this purpose two model tanks of size 50cmx40cmx50cm (outer tank) and 45cmx35cmx45 (inner tank) were used. The 30cm height of expansive soil was compacted in the inner tank in five layers each of 6 cm thickness. The soil was compacted at optimum moisture content. Over the compacted expansive soil 6cm think layer of sand was deposited as coarse material layer to lay (or place) the floor.

I. INTRODUCTION

Expansive soil, popularly known as black cotton soils in India are known to cause various kinds of damages to the structures such as cracks, collapse and slips. These soils are always problematic for lightly loaded civil engineering structures due to swelling and sinking by altering moisture content Venkataswamy, and Rao, (2002). The lack of the knowledge, experience and construction (2003)technology to deal with such soils is main reason for failure. Stabilization or modification of expansive soil by chemical admixtures is a common method for reducing the swell-sink tendency of expansive soils. Among various chemical stabilization method, lime stabilization is most widely method (Wagh, 1999). Piles driven at an angle with the vertical are called batter piles. They resist lateral or inclined load when the foundation material immediately beneath the structure fails to resist the lateral movement of vertical piles. They also may be used if piles are driven into a compressible soil. To spread vertical load over the large area there by reducing final settlement. They may be used alone (batter in opposite direction) or with vertical piles. A study carried by Ritu Mewade (2009) showed that use of short length concrete and bamboo piles below the floor in expansive soils have reduced the swelling and shrinking of floor due to moisture variation in soil.

To explore the adequacy of batter piles (At different inclined angle) below the floor without replacing large volume of existing expansive soils in the minimum time and with economy is selected as the object of this study.

Organization of paper, Section II discusses methodology related to expansive soils, remedial measure including piles (Batter piles) etc. The observations and test result

have been given in Section IV Experimental set up and test procedure has been discussed in Section III. The. Conclusion of short length batter piles in expansive soil under the floor is discussed in Section V.

II. METHODOLOGY

To meet the above objective model test in the laboratory on prepared floor of concrete laid over expansive soil are proposed. The soil movement is thought to be minimized using batter piles .For this purpose a well-designed test set up was built to study the behaviour of different inclined bamboo piles on prepared expansive soil deposit.

The test setup is prepared by scaling down for the (assumed) dimension of a prototype room construction in black cotton soil area. The assumed parameters and corresponding values for prototype and model test set up are as given in table 1.1.

S	Paramete		Model
	rs	Prototyp	
Ν		е	
•			
	Room	Room	Tank with
1			perforations
	Size of		45cmx35cmx45cm
2	room	4.5mx3.	deep (inner tank)
		5m	
	Ingress of	Though	From outer slightly
3	moisture	surroun	bigger tank (50cm x
		ding	40cm x50 cm)
	Size of	4.5mx3.	45cmx35cmx2cm
4	floor	5mx.20	
		m	
	Size of	4.5mx3.	45cmx35cmx5cm
5	wooden	5mx	
	plates	0.50m	

	Depth of	60cm	6cm
6	coarse		
	filler		
	just		
	below		
	floor		
		N A a a a	00
_	Depth of	More	30cm
7	black	than 3m	
	cotton		
	soil		
	Lowerth of	4 F 100	45 and
_	Length of	mc.r	15Cm
8	plie		
	Diameter	20cm	2cm
9	of pile		
	•		

Table 1.1

The experiments were performed on model floor (different inclined piles) over expansive soil base. For this purpose two model tanks of size described above were used. The outer tank was without perforation and the inner tank was with perforations. The 30cm height of expansive soil was compacted in the tank in five layers each of 6cm thickness. The soil was compacted at optimum moisture content and maintained at ±0.5% of an average value of moisture content. The compaction was done with a 4.89 kg hammer with a free fall of 45cm and each layer was given 177 blows so as to deliver a compactive energy 1619 KJ per cubic meter of soil. On expansive soil 6cm thick layer of sand was deposited as coarse filter. Precast cement concrete piece 2cm thick and size slightly less than the plane size of inner tank was placed over the sand layer as the floor. The model floor weighed 6 Kg. Inner tank was put in the outer tank and the water was filled at half height of the outer tank. The water enters to the soil in inner tank through perforations and the soil swelled and sinked. The swelling of expansive soil was monitored at regular interval of time say 15, 30, 45, Minutes. 1, 2, 3, hours etc.. The sinking of expansive soil was monitored at regular interval of time say 2, 5, hours. With four dial gauges reading becomes constant, swelling and sinking was considered completed. The soil was removed; dried and new test bed was prepared as done previously. To reduce the floor cracks due to soil movement, different inclined bamboo piles (batter piles)(15degree, 25degree, 40degree angles) were used with the wooden plates beneath the sand layer. The length and diameter of piles were 15cm and 2cm respectively. In second set up, to install the bamboo piles a hollow rod was used to make the hole and the bamboo piles (vertical bamboo piles) were inserted and sand layer was filled to place the floor.

III. Experimental Set Up And Test Procedure

In this section experiment performed on prepared floor in a test tank with installing piles beneath the floor are described. Black cotton soil used in the present study has been brought from Sports Ground M.A.N.I.T, Bhopal (M.P.) The black cotton soil at site is about 1.5m deep below ground level and is follows by yellow clay. The soil for experiments was collected from shallow depth after removing the vegetation from the ground. The soil is sun dried in an open area for one week. The samples are then pulverized with wooden mallet and made suitable. There is great importance of field tests to evaluate the actual behaviour of pile. However in absence of field tests the carefully conducted model tests can be employed with advantage. For present investigation, a well designed test set up was built to study the behaviour of bamboo and concrete piles placed on expansive soil deposit. The test set up is prepared by scaling down for the (assumed) dimension of prototype room construction in black cotton soil area

Before using the soil in model test set up following experiments are performed in the laboratory test on it and on sand.

- 1. Specific gravity test as per IS 2720(part-4) 1969.
- 2. Classification as per IS-1498-1970.
- 3. Grain size test as per IS 27209part-4) 1985.
- 4. Liquid limit test as per IS 2720(part-5) 1985.
- 5. Plastic limit test as per IS 2720(part-5) 1985.
- 6. Shrinkage limit test as per IS 2720(part-7) 1972.
- 7. Modified Compaction test as per IS 2720(part-7) 1980.
- 8. Differential free swell index IS 2720(part-11) 1977.
- 9. Swelling pressure test as per IS 2720(part-11) 1977.
- 10. Triaxial test as per IS 2720(part-12) 1981

The characteristics of black cotton soil are given in table 1.2

1	Colour	Black
2	Liquid limit	52%
3	Plastic limit	24%
4	Plasticity index	28%
5	Shrinkage limit	12.26%
6	% Finer content (minus75mic.size.)	86.67%
7	Soil classification	СН

8	Specific gravity	2.64
9	Field density (core	1.89gm/cc
	cutter)gm./cc	
10	Swelling pressure(kg/cm2)	0.92kg/cm ²
11	Free swell	48.54%
	Index	
12	Heavy	
(a)	Compaction	18.9%
(b)	Optimum moisture	
()	content (%)	
	Maximum dry density,	1.75gm/cc
	gm./cc	
13	Triaxial Test UV Condition	1.89Kg/cm ²
(a)	on OMC, MDD Prepared	
	sample Conesion (c)	
	Internal friction angle	3°
(b)		

Table 1.2 properties of black cotton soil

The compaction curve for maximum dry density and optimum moisture content are shown in fig.3.1



Figure 3.1 Heavy Compaction Graph

The sand used in this investigation was dry sand. The characteristics of sand are given in table 3. The particles size distribution curve as shown in graph

1Particle size in mm75micto	
-----------------------------	--

		4.75mm
2	Dry density, g/cc	1.56gm/cc
3	Specific gravity , (G)	2.42
4	Size of particle (in mm) at 10% finer, D10	0.27
5	Size of particle(in mm) at 30% finer, D30	0.43
6	Size of particle (in mm) at 60% finer,D60	0.68
7	Coefficient of uniformity (Cu)	2.51
8	Coefficient of curvature (Cc)	1.00
9	Classification of soil	SP

Table 3 properties of sand

Experimental Set up

Tank: Two steel tanks of size 40cm x 50cm x 50cm and 35cm x 45cm x 45cm outer and inner tanks was taken for *experiments works*. The using inner tank is perforation and outer tank without perforation were used as shown in fig 3.2



Figure 3.2 Model of tanks for experiments

Piles- In model test bamboo piles were use as shown in fig 3.3

The bamboo piles of 15cm length were used. The piles were cylindrical of 2cm diameter were used for model test.



Figure 3.3 Bamboo piles

Wooden plates: The holes for placing different inclined bamboo piles (inclination 15degree, 25degree, 40degree, angles). Size of wooden plates 35cm x 45cm x 5cm were used as shown in fig.3.4



(a) Wooden plate



(b) Wooden plate

(Holes for 25 degree angle)



(c) Wooden plate

(Holes for 40 degree angle)

Figure 3.4 wooden plates (holes for different angle

Concrete floor:- A concrete floor slightly less of tank than the area 3.5 m x 4.5 m were prepared for loading on soil, the thickness of floor is 2cm and weight 6 kg as compared to prototype floor weight as shown in figure 3.5



Fig. 3.5 model of concrete floor

Dial gauge: Four dial gauges of least count 0.01 mm were used for experimental works and mounted on slotted angle frames connected firmly with the outer tank. It is fixed and adjusted such that the needle will move freely as shown in

Fig.3.6



Figure 3.6 Dial gauge

Piles group and pile inclination: piles groups were used for experiments i.e. bamboo piles. The piles were installed vertically and also with inclination. The angle of inclination with vertical was varied as 15degree, 25degree, 40degree, angles. Different inclined bamboo piles are chosen with different spacing. The spacing varies according to the number of piles as 7.50cm.

Installation of Piles for Test: A hole was excavated in existing soil with hollow rod having diameter 2 cm respectively. the excavated soil was removed from the hole up to the required depth and pre prepared bamboo piles firmly accommodate in the existing soil. The outer surface of the bamboo piles is made rough for having friction between the contact soil and bamboo piles. The central hole of the piles is filled with the sand up to the complete length without providing pile cap arrangements as figure 3.7 shows the arrangement of different inclined bamboo piles (with 15, 25, 40 degree inclined piles)



Figure 3.7 Arrangements of inclined bamboo piles

(with 15, 25, 40 degree angles)

Four dial gauges were used. Slotted angle were fixed to the wall of outer tank and dial gauges were attached to these. The least count of dial gauge is 0.01 mm. A Dial gauge is used for measuring the swelling of black cotton soil with least count of 0.01 mm as described above when inner tank is kept in to the outer tank and the gap between the two tanks filled with water at half height of inner tank. Water enters in the soil of inner tank than side holes of inner tank and soil tends to swell. The dial gauge reading are recorded at regular interval of time.

After swelling of floor in inner tank is complete, This causes consolidation of soil and water from inner tank holes from into the outer tank. The floor sinks. The sinking is record by dial gauge reading at regular interval of time.

Test Procedure: The test set up for different inclined bamboo and cast in-to situ piles are described as follows. The complete model set up as shown in figure 3.8



Figure 3.8 Model Test Set Up

Test Procedure for different inclined Bamboo Piles:

The sample was taken from the site (M.A.N.I.T. Bhopal) and prepare for testing as describe in above. The 30 cm height of expansive soil was compacted in the tank in five layers each of 6cm thickness. The soil was compacted at optimum moisture content and maintained at \pm 0.5% of an average value of moisture content. The

compaction was done with a 4.89 kg rammer with a free fall of 45cm and each layer was given 177 blows so as to deliver a compactive energy 1619 KJ per cubic meter of soil. wooden plates are used in different inclined bamboo piles (with 15, 25, 40 degree angle) placing and thickness of the wooden plates 5cm thick and size slightly less than the plan size of inner tank. The wooden plates weight 4 Kg. On expansive soil 6cm thick layer of sand was deposited as coarse filter. Precast cement concrete piece 2cm thick and size slightly less than the plan size of inner tank was placed over the sand layer as the floor. The model floor weight 6 Kg. Inner tank was put in the outer tank and the water was filled at half height of the outer tank. The water inters to the soil in inner tank than perforation and the soil swelled and sinked. The swelling of expansive soil was monitored at regular interval of time say 15, 30, 45....Minutes ,1, 2, 3...Hours etc. with four dial gauges arranged at four corners of floor, The sinking of expansive soil was monitored at regular interval of time say 1, 2, 3, ... Hours etc. with four dial gauges arranged at four corners of floor. When dial gauges reading become constant, swelling and sinking was considered as completed. The soil was removed, dried and new test bed was prepared as done previously. To reduce the floor cracks due to soil movement, different inclined Bamboo piles (with 15, 25, 40 degree angles) were used beneath the floor. The length and diameter of piles were 15cm and 2cm respectively.

IV Observation and Test Result

Effect of Swelling and Sinking with Different Inclined Piles: The effects of different inclined bamboo piles on floor movements are discussed in detail in this section. Figure 4.1 to 4.5 depicts effect of using inclined bamboo piles on uplift of floor on soil wetting. It can be observed from the figures 4.1 to 4.5 that the initial portion of each of the individual curves indicates high rate of change of swelling with time which slows down gradually. After about six days of time, curves become entirely horizontal indicating no more change in swelling / uplift of floor.

S. No.	Elapsed Ti (Hours)	me	Swelling (mm)
1	0.00		0.00
2	0.15		0.92
3	0.30		1.48
4	1.00		2.36
5	2.00		3.78
6	4.00		5.60

7	7.00	6.32
8	24.00	8.70
9	26.00	8.99
10	31.00	9.43
11	48.00	10.09
12	50.00	10.12
13	55.00	10.44
14	72.00	10.82
15	74.00	10.94
16	79.00	11.20
17	96.00	11.55
18	98.00	11.67
19	103.00	11.69
20	120.00	11.70
21	122.00	11.70
22	127.00	11.70

Record of soil swelling with elapsed time

(Without piles)

S.	Elapsed Time	Swelling
No.	(Hours)	(mm)
1	0.00	0.00
2	0.15	0.30
3	0.30	0.51
4	1.00	0.84

5	2.00	0.97
6	4.00	1.66
7	7.00	2.38
8	24.00	3.71
9	26.00	3.79
10	31.00	4.15
11	48.00	4.61
12	50.00	4.65
13	55.00	4.69
14	72.00	4.98
15	74.00	5.03
16	79.00	5.15
17	96.00	5.23
18	98.00	5.23
19	103.00	5.24
20	120.00	5.25
21	122.00	5.25
22	127.00	5.25

Record of soil swelling with elapsed time

(With vertical bamboo piles)

S. No.	Elapsed Time (Hours)	Swelling (mm)
1	0.00	0.00
2	0.15	0.51

3	0.30	0.72
4	1.00	0.87
5	2.00	1.42
6	4.00	2.05
7	7.00	2.88
8	24.00	4.58
9	26.00	4.85
10	31.00	5.33
11	48.00	5.88
12	50.00	5.92
13	55.00	6.01
14	72.00	6.19
15	74.00	6.21
16	79.00	6.27
17	96.00	6.38
18	98.00	6.39
19	103.00	6.40
20	120.00	6.41
21	122.00	6.41
22	127.00	6.41

Record of soil swelling with elapsed time

(With 15 degree inclined bamboo piles)

S.	Elapsed Time	Swelling	
No.	(Hours)	(mm)	

1	0.00	0.00
2	0.15	0.50
3	0.30	0.88
4	1.00	1.56
5	2.00	2.54
6	4.00	3.44
7	7.00	4.31
8	24.00	6.31
9	26.00	6.55
10	31.00	6.81
11	48.00	7.29
12	50.00	7.34
13	55.00	7.46
14	72.00	7.65
15	74.00	7.75
16	79.00	7.79
17	96.00	7.81
18	98.00	7.82
19	103.00	7.83
20	120.00	7.84
21	122.00	7.84
22	127.00	7.84

Record of soil swelling with elapsed time

(With 25 degree inclined bamboo piles)

S.	Elapsed Time	Swelling	
No.	(Hours) (mm)		
1	0.00	0.00	
	0.45	0.01	
2	0.15	0.81	
3	0.30	1 1 2	
5	0.50	1.12	
4	1.00	2.06	
5	2.00	3.10	
6	4.00	4.11	
	7.00	5.00	
1	7.00	5.36	
0	24.00	7.56	
0	24.00	7.50	
9	26.00	8.05	
	20.00	0.00	
10	31.00	8.43	
11	48.00	9.05	
12	50.00	9.20	
10		0.00	
13	55.00	9.32	
1/	72.00 0.40		
14	72.00	9.40	
15	74.00	9.41	
	9.41		
16	79.00	9.42	
17	96.00	9.47	
40	00.00	0.40	
18	98.00	9.49	
10	102.00	0.50	
19	19 103.00		
20	120.00	9 50	
	120.00 9.00		
21	21 122.00 9.		
22	127.00	9.50	

Record of soil swelling with elapsed time

(With 40 degree inclined bamboo piles)

V CONCLUSION

The object of present study was to observe reduction in the movement of floor due to installation of batter piles under the floor constructed over expansive soil. For this purpose experiments were carried out on prepared model floor laid over expansive soil base without and with the use of bamboo

piles inclined at different angles from vertical. The details of experimental work and test observations already have been explained in section 3 and 4 respectively. It is observed that the batter piles can reduce the movement of floor laid over expansive soil. The summary of results on floor movement is given in table 5.1. The following conclusions are drawn from table 5.1.

S.	Types Of	Inclination of	Upward	% reduction in	Sinking of
No.	Piles	pile from	movement of	upward floor	Floor due to
	under floor	vertical	Floor due to	Movement due to	water escape
		(degree)	soil swelling	pile installation	In mm
			In mm	(So – Sp /	
				So) x 100	
1	Without	-	11.70	-	0.5
	piles 9 No.				
0	Martical	0		55.40	0.04
2	Vertical	0	5.25	55.12	0.34
	plies 9 No.				
3	Bamboo	15	6.41	45.21	0.32
	piles 9 No.				
4	Domboo	25	7.04	22.00	0.20
4		25	7.84	32.99	0.38
5	Bamboo	40	9.50	18.80	0.37
	piles 9 No.				

Table 5.1 Test Result

- 1 Inclined piles decrease in floor movement.
- 2 % reduction in upward floor movement due to pile installation is defined as $Sup = So Sp / So \times 100$
 - Where So = Floor movement without pile

Sp = Floor movement with pile

The value of Sup is 55.12 % for vertical bamboo pile.

- With the inclination of pile the value of Sup decrease for both bamboo.
- 4. For a particular material of pile as the inclination of piles vertical increase. The value of Sup decrease. The variation of Sup with inclination from vertical is shown in fig. 5.1.It is clear from figure 5.1.
- 5. The water was allowed escape from the water removed from outer tank. It cast draining water from the soil. The downward movement of the floor was recorded for six days. The sinking of floor due to water escape was noted. It is found that installation of piles has little effect on sinking of floor during the period of observation as it evident from the table 5.1. From the above it may be finally calculate that inclination of pile are prefeble than the batter pile.



References

- 1. Arora K.R. (1997). "Soil Mechanics and foundation Engineering". Standard Publisher. New Delhi.
- 2. Brahmabhat, VS et al (1992) " in situ stabilization of expansive soil by lime and lime-soil coloumns". Proc. Igcc, 1992 Calcutta 1992, 18-20 dec. vol-1 pp.190193.
- 3. FORM 4591 department of planning and building,(2007), " construction on expansive soils. www.ci.chula-vista.ca.us.

- 4. For online Material on "BATTER PILES" Visit http;//www.dounload-it.org/learning-resources.php
- 5. IS: 1498-1970 "classification and identification of soil for general engineering purpose", bureau of Indian standard, manak bhawan, new delhi.
- 6. Mewade, Ritu. (2009), Repair of sinking floors laid over expansive soil An Integrated Approach, M.Tech. Thesis NIT Bhopal.
- 7. Mandal, A.K. (2002). " behaviour of enlarged piles in sand under oblique pullout loads", Indian geotechnical journal, 32, (2002).
- 8. Ranjan gopal, and rao A.S.R, (2002)." basic and applied soil mechanics". New age international, New Delhi.
- 9. Roth, W.H., H. Fong, and C. de robertis. 1992. "batter piles and the seismic Performance of Pile-Supported wharves." Procoodings of parts 92. ASCE 1992:336-349.
- 10. Vandaswamy, B., (2003). Geotechnical engineering for infrastrural development, dec,18-20,2-3, roorkee.

Finite Element and Aspects of Exergy Evaluation of Conventional Forging Deformation Behaviour of Material Processing

Santosh Sanodiya¹, Dr. Keshvendra Choudhary², Dr. Manvijay Singh³

¹Research Scholar, Department of Mechanical Engg, Dr. K.N. Modi University, Newai, Rajasthan ²Principal, School of Research and Technology, People's University, Bhopal, M.P. ³Prof. & Head, Department of Mechanical Engg, Dr. K.N. Modi University, Newai, Rajasthan santoshsanodiya09@gmail.com

Abstract

The present paper proposes a material mechanical processing in which the forming begins at the location of the deepest feature and gradually shapes up the features by taking advantage of rigid-body motions. Compared to the conventional forming used in processing, this strategy can dramatically improve geometric accuracy, increase formability, form components with desired thickness and create complex components. Furthermore, an examination of the forming forces shows that the dominant forces using this strategy are in the specimens resulting in a significant improvement in geometric accuracy. The paper examines the deformation behaviour of geometrical specimens of an aluminium alloy undergoing axial compression in a Universal Testing Machine under dry condition. It is observed that researchers have made attempts to investigate alternate specimens for friction calibration. It is found that ring compression test is recommended as the standard test for determination of coefficient of friction, because it gives reliable results. The effect of weight percentage of silicon carbide on microstructure, hardness and upsetting load is studied. The friction factor at die metal interface is evaluated by ring compression tests and its effect on non-uniform deformation is investigated. The experimental results are finally compared with those obtained by FEA simulation and modelling. In order to validate the predictability of these specimens, real experiments on them are carried out. Rings of standard dimensional ratio 6:3:1 in the same machine. Friction predictions from both specimens are found to be in close match, proposed alternate specimen offers a powerful tool for friction prediction in the absence of ring specimen. Some aspects of Exergy calculations have been in the past repeatedly used to quantify the quality and quantity of energy used in thermal energy processes. This attempt to drive a exergy utilization and compare for the first time two entirely different manufacturing processes, material processing by a mechanical method of straining of the material and thermal processing during cold forging of the same mass of the material using exergy formulation as metric. The exergy analysis of material processing is determined by performed work and utilized heat transfer using mechanical and thermal processes.

Keywords: Forming; Friction; FEA; Calibration Curve; Ring compression; Non-Conventional Specimen; Exergy

I. Introduction

Metal forming processes have been widely used in various industries, including automotive, aerospace, medical, appliance, beverage containers, etc. Metal forming processes involve changing the shape of the work piece by forcing it to flow through a die. Forming can be defined as a process in which desired size and shape is obtained through the plastic deformation of a material. This requires immediate contact between the die (tool) and the work piece. In general, the work piece and the die move relative to each other under pressure or deforming force, which is normal to the die/work piece interface. As a result of this contact, tangential forces are generated at the interface of the die/work piece to resist the relative movement. In order to analyze forming processes, the metal flow, the friction at the die/work piece interface and formability of material have to be described for a given process. For example the coefficient of friction in cold forming is generally of the under of 0.1, whereas that in hot forming can be as high as 0.6. Production and consumption of goods is increasing more voluminous in manufacturing fields and will be even much faster in the future. What should be done to keep up with the increasing demand and customers wanting better quality products but with less pronounced impact on surroundings and with increased positive impact on society? There is a need to develop and maintain sustainable processes in every field and manufacturing is no different. The ever increasing demands and better quality creates a need to develop and continuously monitor and evaluate the appropriate metrics for assessment for manufacturing processes. One such metric for comparison is attempted to be developed in this thesis by the use of thermodynamics and it is based on the concept of exergy (2005). Exergy is the maximum

extractable available energy from a system when it interacts with its surroundings. It carries the same units as work (energy), which is Joule (in SI system of units). However, exergy is not conserved like energy (2005). Every process in manufacturing is founded on the basic principles of conservation and transfer of energy between the involved systems, and thus deals also with transfer, use and destruction of exergy. So, the use of the exergy concept would be plausible as a metric to compare two processes. The concept of exergy is derived from the First and Second laws of Thermodynamics and with an emphasis on the Second Law of Thermodynamics. The aim of paper work is to attempt a comparison between two entirely different materials processing activities relevant for manufacturing processes but using the same metric-exergy. The objective of the study is to see whether both can be evaluated and compared using a common metric. There has been not much work done in this particular field of study of systems involving materials processing for manufacturing. To the best of the author's knowledge, there was not a common metric (exergy) that involves both quantity and quality of energy used to compare two entirely different processes. So, the main hypothesis of

this work is that a common metric can be used to compare different materials processing with respect to resource (energy) utilization.

II. ROLE OF COMPUTER SIMULATION IN METAL FORMING

In metal forming, a piece of material is plastically deformed between tools to obtain the desired product. Before the digital revolution, only few analytical tools were available to judge the manufacturing feasibility. Today, computer based metal forming simulation tools enable the validation of the tool and machine designs for production and an estimate of the final work-piece properties to be expected. The manner in which the material is worked directly determines the final product quality. Kaguchi Shin et al. (2000) demonstrated si-tu measurement is method to read data of reduction in height and change in external diameter of ring specimen by testing machine automatically during compressing. Sofuoglu et al. (2001) developed an alternative method to the ring compression test in order to quantitatively evaluate the coefficient of friction, m; at the die/work piece interface. This technique relates the percentage deformation in height of the specimen to the percentage increase in extruded height of the specimen. Sahin et al. (2005) proposed a new approach to investigate the effect of the surface roughness on the frictional properties for different materials and conditions. Experimental results were placed into ring compression calibration curves for each of the material type and surface conditions. Rudkins et al (1996) performed experimental investigation into friction under hot forming conditions using the ring compression test. Finiteelement simulations of the ring compression test were also completed under similar temperatures as in the experiments. The correlation between the experimental measurements and the results of the process modeling is presented in the paper. The analysis had been carried out for different values of friction factor 'm' between the die and the specimen and for different values of initial height to diameter (H/D) ratio of the specimen and curves have been plotted for the ratio of spike height to initial height of the billet against the ratio of die displacement to initial height of the billet. Kakkeri et al (2007) analysized the metal forming processes and found that a realistic frictional condition must be specified at the die/work piece interface in order to obtain accurate metal flow. They evaluated the coefficient of friction for AI 6061 and AI 6063. Sofuoglu et al. (2000) investigated the effects of material properties, strain-rate sensitivity, and barreling on the behavior of friction calibration curves. A series of ring compression tests were conducted in order to determine the magnitude of the friction coefficient, m, as well as the corresponding calibration curves for two types of modeling materials, white and black plasticine. The experiments were first conducted using the Physical Modeling Technique (PMT) and then simulated via an elastic-plastic finite element code (ABAQUS). Robinson et al. (2004) studied the ring compression test using physical modelling experiments and finite element (FE) simulation. Using commercially available modelling clay, material stress- strain relationships were obtained from compression tests of solid cylindrical specimens. A series of ring compression tests were carried out to obtain friction coefficients for a number of

lubricants including Vaseline, zinc stearate and talcum powder. FE simulations were used to derive the friction calibration curves and to evaluate material deformation, geometric changes and load–displacement results.

Further investigation is necessary to determine the effects of material properties, test conditions and use of calibration curves on the ring compression test. Rao K.P. et al (1993) this paper presents a review of the calibration curves developed by various researchers, and discusses their usefulness and limitations for quantitative evaluation of friction and flow stress. The experimental data obtained for some aluminium alloys is used for comparing the validity of the calibration curves. A calibration using a bulge parameter based on the maximum diameter and minimum diameter of the bulge is then developed as a function of the interface friction factor. Hayhurst et al (2004) proposed a new technique to calibrate the model, which utilizes two test piece geometries, namely the solid cylindrical compression test piece and the ring compression test piece. The geometrical changes of all test pieces, carefully measured throughout the tests, for a range of four different friction conditions, dry friction, lubricant, lead metal and nylon, have been predicted with good accuracy using the true stress-true strain constitutive models, the twoparameter friction model, and the finite-element analysis procedures. Wang. W et al. (1996) developed a new test to incorporating a smooth increase of wrap angle during deformation, even at high deformation rates, thus replicating typical condition die radii. Bugini A. et al (1993) in this study FEM calibration chart for ring upsetting at room temperature is drawn when dealing with annealed Aluminium specimens of different height. The method allows the evaluation of the friction coefficient affecting the plastic flow when Teflon films are interposed between dies and specimens. Lee Chorng-Der et al. (2001) developed a method to find the friction factor of the die/work piece interface for the forging process without the need for measurement of the shape changes of the work piece. B. Buchner et al. (2008) presented an experimental investigation of friction in hot forging of AA6082. which is a standard forging alloy in automotive engineering, mechanical engineering and in naval architecture, by employing a modified ring-on-disc test.. Rao et al. (2008) used cylindrical Al-Cu alloy samples with initial aspect ratios of 1.0 and 1.5 between flat platens in lubricated and dry conditions to predict the metal flow. Micro hardness studies revealed the non-uniform deformation within the specimen. Guerin J.D. et al (1999) in this study The Bay-Wanheim's generalized friction law, developed to model mixed and thin film lubrication cases, is implemented in an industrial finite element software. Both the axisymmetric and 3D formulations are presented. These developments are validated on the ring compression test and numerical, experimental and analytical results are then compared. Joun M.S. et al (2008) compared and investigated the coulomb friction law and the constant shear friction law in detail using a rigid-plastic finite element with emphasis on their application in bulk metal forming. The ring compression test for two different materials was used to evaluate the two friction laws, and then their effect on metal flow lines and forming loads for various friction sensitive metal forming processes were investigated. It was shown that considerable differences exist between the two friction laws, especially in friction-sensitive metal forming processes. To the best of our knowledge no attempt has been made to generate friction calibration curve using centre intrude non- conventional specimens of aluminum material and its validation with standard friction calibration curves.

Detailed study on how the friction calibration on specimens behave during deformation and what type of deformation taking place on the FE deformed mesh has not been conducted. The deformation on centre intrudes and its dependency on the characteristics of ring compression test has not been crystallized so for. This could be studied in detailed for in depth understanding through finite

3. EXERGY ANALYSIS

Every manufacturing system has inputs, like energy and working materials, and outputs, like finished parts. Additionally, each system creates entropy and waste streams, which are dismissed to the environment. The concept of exergy analysis can be used to characterize and accumulate work, heat and material streams entering and leaving manufacturing systems (2000). An exergy balance can be formulated for every manufacturing system as follows:

$$B_{in} + B_{W,in} + B_{Q,in} = B_{out} + B_{W,out} + B_{Q,out} + B_{loss}$$

The exergy of the aggregated materials entering and leaving the system are represented by $B_{in/out}$.

The components, $B_{W,in/out} = W_{in/out}$ and $B_{Q,in/out} = (1 - \frac{T_o}{T})Q_{in/out}$ show the exergy flows accompanied with work and heat, respectively. Any work required beyond the minimum requirements is lost and expressed by B_{loss} . For this analysis, all exergies *B* are calculated in respect to the reference state $T_0 = 298.15$ K and $p_0 = 101.3$ kPa. The first step in any system analysis is to identify the system boundaries. Depending on the enclosed control volume, results may differ substantially [9]. Here, we investigate this process for two different control volumes.

The method of exergy analysis is well suited for furthering this goal, for it enables the location, type and true magnitude of waste and loss to be determined. Such information can be used to design new systems and to reduce the inefficiency of existing systems. This paper provides a brief survey of both exergy principles and the current literature of exergy analysis with emphasis on areas of application.


3.1 Concept of Exergy and Its Applications:

Exergy is a thermodynamic concept and is defined as "Optimal work that can be extracted from a system as it interacts with an environment" (2005). Exergy is additive but not conserved and the different types of exergy *B* can be represented by the following equation (2001).

 $B = Bk + B_p + B_p h + B_c h$

Where B_k represents kinetic exergy, Bp represents potential exergy, Bph represents physical exergy and Bch represents chemical exergy for better understanding of different types of exergy). There has been a lot of work done in the field of exergy analysis (1999). It is also mainly used in consideration of ecological concepts which can be used to assess the influence on the environment. The basic definition, the concept, the formulation and explanation of exergy use is clearly discussed by Rosen (2005). Before the use of exergy analysis has been developed, the energy analysis has been used with a wide range of economic, environmental and efficiency studies. Brunhes showed the drawbacks of energy assessments only. The loss of exergy which is caused by the irreversibility of the process is directly linked to the entropy change. The relationship that defines this loss is called the Gouy-Stodola's theorem represented by the following equation (1999).

$B = T_0 \sum (\Delta S)$

This particular equation is extensively used in paper especially for the thermal exergy calculations. This provided the base to correlate the entropy generation and exergy utilization meaningfully. This value is obviously very low; therefore the exergy analysis reveals clearly the possibilities for improvement. The study is done on material, energy and exergy balances of the system as a whole and of its separate elements.. Process design guides transforming of raw materials into the finished products (2000). This study promotes two approaches for process design. One being hierarchic (called in the study) the other approach being

mathematical approach. Using the exergy calculations, a new approach for chemical process synthesis has been developed. It shows that this approach may be used to define a more exergy efficient benzene synthesis process (2000).

4. EXERGY UTILIZATION FOR MATERIALS PROCESSING OF AI ALLOY

The analysis offers an approach to both theoretical and experimental evaluation of mechanical (elastic and plastic) exergy utilization needed to perform certain mechanical deformation. This exergy amount constitutes a component of the overall exergy utilization within a material's processing during manufacturing. Assume that the material used to manufacture, say the heat exchanger tubes of a compact heat exchanger is initially in the form of a flat plate (without considering elastic/plastic exergy for due to a prior process of metal forming. The cylindrical bar has a diameter *D*, length *l*, and height *h* indicated.



Fig 4 .Initial (a) and final (b) shape of the material before and after metal forming

The conclusion made was that the substitution of useful energy by the value of minimal exergy consumption when studying chemical or metallurgical processes and manufacturing a product makes it possible to apply such universal indices as energy and exergy efficiencies. An exergy analysis is the combination of the first and second laws of thermodynamics. In an exergy analysis, the time rate of heat does not have the same value as the power, and the losses represent the real losses of work. When analysing novel and complex thermal systems, however, such experience needs to be supplemented by more rigorous quantitative analytical tools, and exergy analysis provides those tools. If the system operates at a steady state, steady flow condition, and all the non-reacting gases are arbitrarily assigned as zero thermo mechanical enthalpy, entropy, and exergy under the conditions of ambient pressure and temperature regardless of their chemical composition, then the entropy of mixing different gaseous components can be neglected and the general exergy balance is given as (2002).



Fig. 5 The Stress- strain curves of center intrude 1



Fig. 6 The Stress- strain curves of center intrude 2



Fig. 7. The stress-strain curves of a ring comp. test

The material undergoes a significant strain during metal forming and there must be significant exergy utilization during this process. The amount of exergy used must be equal to the work done on the material. Hence, in a mechanical process (a process involving a mechanical work only); the exergy use is trivial to determine, if one has all the information needed for determination of the needed work. A need to express this work in terms of exergy, however, is not a semantical issue. The importance of the introduction of exergy is justified by the fact that exergy equivalent of a non-mechanical materials processing would not be possible to determine using the energy balancing only. Such exergy quantity would involve the quality of thermal interactions. In such a manner, a common metric (exergy) for mechanical and non- mechanical processing will be possible to evaluate. The work done in a mechanical process can be obtained by calculating the integral involving the stress-strain dependence (a theoretical amount with no losses). The general shape of the stress-strain curve is presented in Fig 5. The elastic and plastic exergy uses are presented in the Fig 5,6,7. Therefore, calculating the area under the stress-strain curve would give us the work which can be represented as an exergy use involved with material forming (2003).

5. FEA SIMULATION & EXPERIMENTS METAL FORMING SETUP

The methodology of this experimental numerical study on investigation of nonconventional friction specimen incorporates following steps:

To obtain the flow curve, tensile test using a commercial aluminium specimen is carried out. An aluminium specimen of gauge length 80 mm, prepared as per ASTM standard, is tested in a Fine make Universal Testing Machine (UTM). The test and tested specimens are shown in. The summary of the results obtained from the tensile test are as follows:

- (a) Ultimate Tensile Strength = 161.57 N/mm^2
- (b) Yield strength = 123.13 N/mm^2
- (c) Ultimate strain = 0.2
- (d) Yield strain = 0.002

The engineering stress & strain are converted into their true counterparts using standard relationships (Kalpakjian and Schmid, 2004). Based on these results, material modeling is carried out using the power law equation (Meyers and Chawla, 1997):

$$\sigma = k\epsilon^n$$

where k is the strength coefficient and n is the hardening exponent. The value of k and n obtained from the tensile test results are 225.4 MPa and 0.095 respectively. These data are used in the finite element (FE) simulations. Two centre intrude specimens are proposed for friction study. Geometry of the centre intrude specimen I and II are shown in Fig. 8 & 9.



Fig. 8 Geometry of Center Intrude I specimen



Fig. 9 Geometry of Center Intrude II specimen



Fig. 10 Prepared Specimen of Center Intrude I



Fig. 11 Deformed specimen of Center Intrude I

6. PREPARATION OF RING SPECIMENS

Using the same lathe machine and Aluminum piece two ring specimens are also prepared. The dimensions of the rings are –

- (a) Outside Diameter OD = 38 mm
- (b) Inside Diameter ID = 19 mm
- (c) Height H = 6.33 mm

A typical photograph of ring preparation by Dieter, OD:ID:H ratio is 6:3:1. Thus prepared ring is shown in Fig.12.



Fig. 12 Prepared ring specimens





Fig. 13. FEM – model of the Center Inture I (a) before and (b) after compression.



Fig. 14. FEM – model of the Center Inture II (a) before and (b) after compression.

Results of experimental and simulation studies can be described under following heads :-



Fig. 15: Friction Calibration Curve Centre Intrude I



Fig. 16: Friction Calibration Curve Centre Intrude II

It can be observed that friction calibration curves predict quite accurate results as compared to the ring compression test. Hence such alternate specimens may play important role in friction determination in absence of ring specimens. The results obtained for the exergy utilization per unit area for AI alloy based either on analytical prediction or experimental work indicates a small variation. Therefore, it is concluded that the exergy utilization for Aluminum materials can be performed using 'Ramberg-Osgood' calculations if the empirical values for exponent "n" is calculated. In that case, analytical integration can be performed without a need for experimental data handling. The average value of exergy utilization for mechanical process per unit area obtained from the theory using Ramberg-Osgood equation is $B_{m,ph}/A_{area}$ = 4218.03 kJ/m². and the value obtained from the experiment is $B_{m,ph}/A_{area} = 4147.35 \text{ kJ/m}^2$. For better accuracy of the calculations, the value obtained from the experiments should be considered for comparison. The main point is to deduce that the total exergy utilization to achieve a strain of the body of 0.06 can be used as a metric for exergy utilization to be compared with corresponding values for other processes. The total exergy utilization for volume is equal to the product of exergy utilization per unit square meter times the area of the work piece (pt). That is equal to $B_{m,ph}/A_{area}$ = 1338 J of exergy utilization for a given mechanical deformation of 0.06 strain.

7. Conclusion

Using the concept of exergy two analyses with different control volumes were carried out aiming to compare conventional forming and their processing exergy in case of small production runs. In this study a search has been made to find alternative specimens for friction calibration using finite element simulation. Two non-conventional specimens were tried for this purpose. It is observed that these two specimens could undergo consistent deformation with respect to varying friction. Friction calibration curve, for these two eligible specimens are generated using simulation results. Actual experiments on these non-conventional specimens were also carried out. A ring of standard dimension is also tested in the same machine. When compared, both specimen gave very close friction value. These non standard specimens can be used as a substitute to ring compression test for friction determination. Hence, friction prediction becomes guite simple using such specimens, especially in the absence of ring specimens. Using the concept of exergy two analyses with different control volumes were carried out aiming to compare conventional forming and their processing exergy in case of small production runs. The first exergy analysis showed that the exergy of the material input dominated the electricity input. Particularly, the exergy of the conventional material contributed a significant fraction to the total exergy input. Consequently, the degree of perfection resulted in relatively high values. The main conclusion is

drawn from the analysis that Exergy utilization can be used as a common language (as a metric) to asses entirely

different processes. If a material undergoes a series of different operations to attain its final shape, one can calculate the total exergy utilization involved in the whole process. And if there is a second series of operations to attain the same product, a comparison of these two methods can be made using exergy utilization as a metric to asses the better of the two methods. One can also infer that the work done in a mechanical processing of straining can be better efficient than the thermal processing of conventional forging at room temperature for the same exergy utilization.

REFERENCES

1. B. Buchner, A. Weber and B. Buchmayr, Investigation of friction in warm forging of AA6082, International Journal Of Material Forming, VOLUME1, supplement/1 January (2008), 1215-1218.

2. ugini A., Maccarini G., Giardini C., Pacaggnella R. and Levi R., The Evaluation of Flow Stress And Friction in Upsetting of Rings and Cylinders, CIRP Annals-Manufacturing Technolgy, Vol. 42, 1993, Pages 335-338.

3. Cecil D M R, Rajadurai A, Friction Measurement in Bulk Forming using Spike Forging Test, Journal of Production Engineering Divisional The Institution of Engineers (India), 86, March (2006)

4. Guerin J.D., Bartys H., Dubois A. and Oudin J., Finite element implementation of a generalized friction model: application to an upsetting-sliding test, Finite Elements in Analysis & Design, Vol. 31, 1999, Pages 193-207.

5. Hayhurst D.R, Chan M.W., Determination of friction models for metallic die work piece interfaces, International Journal of Mechanical Sciences, Vol. 47 (2005) 1–25

6. Honerkamp, J. (2002). <u>Statistical physics</u>. Springer. p. 298. . "The maximum fraction of an energy form which (in a reversible process) can be transformed into work is called exergy. The remaining part is called anergy, and this corresponds to the waste heat.

7. Joun M.S., H.G. Moon, I.S. Choi, M.C. Lee and B.Y. Jun, Effects of friction laws on metal forming processes, Tribology International, (2008) Pages 311-319.

8. Dincer I, Rosen MA. Thermal Energy storage Systems and Applications, John Wiley & Sons, Chichester (England); 2002.

9 Kaguchi Shin (Hachinohekodai Daigakuin) and Ouchi kiyoyuki (Hachinohe Inst. of Technol., Fac. of Eng.), Measurement of Friction Coefficient in Metal Forging, Bulletin of Hachinohe Institute of Technology, **Vol.**19; 2000; **Pages17-**23

10 Kakkeri Shrishail, Dinesh P and Kumar Chetan, Determination of friction coefficient by ring compression test for al-6063, International Conference on Advanced Materials and Composites (ICAMC-2007), Pages 24-26.

11 Kalpakjian, S., and Schmid, S.R., Manufacturing Processes For Engineering, fifth edition, Prentice Hall, 2004.

12 Lee C.H. and Altan T., "Calibration Curve for Upset Ring Test with outside diameter, inside diameter, and thickness in a ratio of 6 : 3 : 1 Trans. ASME Ser. B: J. Eng. Ind., Vol. 94, 1972, p. 775.

13 Lee Chorng-Der, Cheng-I Weng and Jee-Gong Chang, A prediction of the friction factor for the forging process, Metallurgical and materials transactions B, Volume 32(2001), 137-143

14 Meyers M.A., Chawla K.K., Mechanical behaviour of materials, the fundamentals of elastic, Second Edition, (Prentice-Hall, 1999).

15 Rao K.P. and Sivaram K., A review of ring-compression testing and applicability of the calibration curves, Journal of Materials Processing Technology, Vol. 37, 1993, Pages 295-318.

16 Robinson. T., H. Ou, C.G. Armstrong, Study on ring compression test using physical modeling and FE simulation, Journal of Materials Processing Technology 153–154, (2004) 54–59.

17 Rudkins N.T., Hartley. P, Pillinger.I a, Petty. D b, Friction modeling and experimental observations in hot ring compression tests, Journal of Materials Processing Technology, 60 (1996) 349-353.

18 Sahin Mumin, Cem S. Akata H. Erol, Effect of surface roughness on friction coefficients during upsetting processes for different materials, Materials and Design 28(2), (2007) 633-640.

19 Sivaprasad P V and Davis C H J, An assessment of the interface friction factor using the

geometry of upset specimens, Modelling & Simulation in material science and Engg, Vol 13, (2005),

Pages 355-360.

20 Sofuoglu H., Gedikli. H., Determination of friction coefficient encountered in large deformation processes, Tribology International, 35 (2002) 27–34

21 Sofuoglu Hasan, Assistant Professor, Jahan Rasty, Associate Professor, On the measurement of friction coefficient utilizing the ring compression test, Tribology International, 32(6), (1999), 327-335

22 Wang.W, Wagoner.R.H, and Wang X. J., Measurement of Friction under Sheet Forming Conditions, 27A, December (1996), 3971

23 G.E. Deiter, "Workability Tests", Metals Handbook Volume 14. Forming and Forging, ASM International, Materials Park, OH, 1988, p379-381.

24 G.E. Deiter, Mechanical Metallurgy, Mc Graw-Hill, Inc., Boston, MA. 1986, p539-549.

25 User' manual, ABAQUS Software Corporation, Santa Ana. California, USA, (2015)

26 Szarbut J., Morris, D.R., Steward, R., Exergy Analysis of Thermal, Chemical and Metallurgical Processes, (1988) Hemisphere Publishing Corp., New York, U.S.A., pp330.

27 Rosen, M., Exergy, Canadian Consulting Engineer, Don Mills, (2005) Ont: Huge C Mac Lean Publications, Vol.46, pp25-28.

28 Brunhes B., La Degradation De L, energie, Flammarion, France, pp410.

29 Moran. M.J., Fundamentals of Engineering Thermodynamics, John and Sons, Inc., 3rd edition, pp. 282-291.

30 Sorin, M., Hammache, A., Diallo., O., Exergy Based Approach for Process Synthesis, Energy, (2005), Vol. 25., pp. 105-129.

31 Bakshi. B., A Thermodynamic Framework for Ecologically Conscious Process Systems Engineering, Computers and Chemical Engineering, Vol. 26, pp. 269-282.

32 Ugural. A., Fenster. S., Advanced Strength and applied Elasticity, Pearson Education Inc., (2003), pp. 370-413.

33 Masini, A., Ayres, L., Ayres, R., The Center for the Management of Environmental Resources, Fontainebleau, France, pp. 2-18.

34 Rosen, M., Dincer, I., Exergy methods for assessing and comparing thermal storage systems, International Journal of Energy Research, (2003), Vol.27, pp. 415-430.

35. Rosen, M., Dincer, I., A Study of Industrial Process Heating Through Exergy Analysis, (June 2004) International Journal of Energy Research, Vol.28, pp. 917-930.

36. Feng, X., Zhong, G., Zhu, P., Zhaolin, Gu., Cumulative Exergy Analysis of Heat Exchanger Production and Heat Exchange Processes, (2004), Energy and Fules, Vol.18, pp- 1194-1198.

37. Ayres, R., Ayres, L., Warr, B., Exergy, Power and Work in the US Economy, 1990-1998, (2003)Energy, Science Direct, Vol. 28, pp. 2 19-273.

38. Stepanov, V., A Method for Estimating the Energy Efficiency of the Economy, (1995) Energy, Vol.20, pp.577-583.

Analysing the Performance of Map Reduce Engine Using Data Prefetching Mechanism

Sweta Gupta¹, Abhilasha Singh², Sudhir Goswami³

1Assistant Professor, Jagran Lakecity University,Bhopal 6.shwetagupta@gmail.com 2Assistant Professor,Jagran Lakecity University, Bhopal Singhabhilasha8791@gmail.com 3Assistant Professor, People's University,Bhopal 10188sudhir@gmail.com

Abstract

In this massive technological atmosphere the number of information generated is increasing at an awfully high rate. Distributed storage system will be used for storing this immense quantity of information. Massive information will be handled by victimization hadoop and map reduces. The multiple node clusters will discover victimization the hadoop framework. Hadoop comes with default distributed file system that is hadoop distributed file system. The mapped is enforced by map technique and that we can see the performance of map reduce task on the bases of bytes written. The amount of bytes written by map task doesn't increase with the amount of files increasing. The explanation is that once the reduce function perform reduces the map output it simply combines the output of the map function. Thus so as to enhance the performance of map reduce task we are going to setup the cluster of nodes in heterogeneous atmosphere and analyze the behavior of map reduce task victimization the perfecting mechanism.

Keywords: Hadoop, hadoop distributed file system, map reduce, prefetching mechanism.

1. Introduction

BIG DATA IS THAT THE TERM USED FOR A GROUP OF KNOWLEDGE SETS THUS MASSIVE AND COMPLICATED THAT IT BECOMES TOUGH TO METHOD USING HANDS ON MANAGEMENT TOOLS OR ANCIENT PROCESSING APPLICATIONS. HUGE KNOWLEDGE SUGGESTS THAT HEAPS AND MUCH OF KNOWLEDGE I.E. KNOWLEDGE FROM TERABYTES TO PET BYTES THE CHALLENGES EMBRACE WITH HUGE KNOWLEDGE IS HOW WE ARE ABLE TO CAPTURE, CREATE, STORE, SEARCH AND SHARE THIS IMMENSE QUANTITY OF KNOWLEDGE. THE MASSIVE KNOWLEDGE CHARACTERISTICS ARE VOLUME, VARIETY, TRUTHFULNESS AND RATE

Characteristics	Description		
volume	Huge amount of		
	data		
variety	Different forms of		
-	data		
velocity	Rate at which data		
-	flows		
Table 1. Characteristics of Dir Date			

Table 1:-Characteristics of Big Data

Big data client situation includes net and e-tailing, adhere card, health care and natural science, banking and money services and retails.

Hadoop is that the best resolution for big data problem [1]. Hadoop could be a framework that leave distributed process of enormous large sets across clusters of trade goods computers employing an easy programming model.

Hadoop is an open supply knowledge management with scale out storage and distributed process. Hadoop core parts area unit are HDFS (hadoop distributed file system) and reduce.

Hadoop relies on master slave design. Characteristics of hadoop area unit Reliable as a result of fault tolerance, Economical as a result of trade goods hardware, scalable and versatile.

2. Related Work

To increase the performance degradation caused by data transmission, some work is done. Data transmission overhead can be removing by using data prefetching mechanism. To avoid directly modifying the native Hadoop, a bi-directional processing approach is proposed in HPMR [2]: the processing fetches the data from the beginning of the input split while prefetching fetches the data from the end. While the proposal in this paper fetches data from the beginning of input data to reduce the overhead of data transmission at the maximum.

Some researchers focus on optimizing task scheduling algorithms or data replication policies to improve data locality in Map Reduce [3]. These proposals only improve the probability of data locality in MapReduce and may increase the complexity of achieving load balance. The LATE scheduling algorithm is proposed for Map Reduce in heterogeneous environments [4]. M. Zaharia et al., have proposed a delay scheduling algorithm, which addresses the conflict between locality and fairness in shared Map Reduce cluster [5]. In MTSD [6], computing nodes are classified by computing capability and a modified task scheduling algorithm is studied. X. Zhang et al. have studied scheduling with consideration about data locality in homogeneous cluster [7]. DARE is a distributed adaptive data replication algorithm that is sensitive to the heterogeneity of computing nodes, and the more powerful nodes get more data replications [8].

3. AREA OF STUDY

Big data are often handled by exploitation the Hadoop and Map reduce. The multiple node clusters are often got wind of exploitation the Hadoop and map reduce. Our space of interest during this paper is how map reduce works .The environmental execution of Map Reduce task will be outlined. Map reduce may be a programming model and an associated implementation for process and generating massive knowledge sets with a parallel, distributed algorithmic program on a cluster.

A Map reduce program consists of a Map () procedure that performs filtering and sorting (such as sorting students by name into queues, one queue |for every name) and a Reduce () procedure that performs an outline operation (such as enumeration the quantity of scholars in each queue, yielding name frequencies). The "Map reduce engine" (also known as "infrastructure" or "framework") orchestrates the process by marshalling the distributed servers, running the assorted tasks in parallel, managing all communications and knowledge transfers between the assorted components of the system, and providing for redundancy and fault tolerance.

The model is impressed by the map and reduces functions normally utilized in useful programming though their purpose within the Map reduce framework isn't an equivalent as in their original forms. The key contributions of the Map reduce framework don't seem to be the particular map and reduce functions, however the measurability and fault-tolerance is achieved for a range of applications by optimizing the execution engine once.

Map reduce libraries are written in several programming languages, with completely different levels of improvement. A well-liked ASCII text file implementation is Apache Hadoop. The name Map reduce originally spoken the proprietary Google technology, however has since been generalized.



4. Research Direction

Data locality issues in Hadoop-

Map reduce may be a programming model for process giant knowledge sets which are present in hadoop distributed filing system. As we all know that hadoop suffer from data locality downside therefore by using prefetching theme with hadoop hardware we are able to sharply explore for ensuing knowledge blocks to be prefetched thereby avoiding I/O stalls that increased throughout the information interval. With the assistance of prefetching theme we'll be ready to utilize the mainframe processes in knowledge nodes of a hadoop cluster .The hadoop cluster performance are exaggerated simply, and therefore the interaction between the master and slave nodes are exaggerated.

As we all know that once high knowledge intensive applications area unit running on hadoop cluster mainframe and I/O area unit underutilized. To utilize the mainframe and I/O we'll use prefetching theme. Hadoop is mostly used for larger knowledge sets i.e. up to sixty four MB of information or 128 M.B {of knowledge} that the knowledge transfer time of those larger data blocks dominates the I/O interval. That the time interval of this massive knowledge sets area unit get affected owing to underutilized mainframe and I/O stalls. Therefore this motivated North American nation to analyze prefetching technique else I/O performance of HDFS cluster and map reduces.

Data node communicated with the name node so as to work out from wherever the information node got to browse the information or the situation of the information, name node contains the data which data it provides to the corresponding knowledge nodes so knowledge nodes should grasp from wherever he has to browse the

information whereas providing the data to the information nodes. The mainframe of the corresponding nodes must look forward to a clear period whereas the nodes area unit act with the master node to accumulate the Meta knowledge.

We can in work the prefetching mechanism with {the knowledge|} process procedure in hadoop to stop mainframe from looking forward to master node to deliver Meta knowledge to data nodes.

The basic plan of our prefetching theme is to preload knowledge from native disk and places the information into the native cache of the information node as early as doable with none beginning delay of latest tasks appointed to the information nodes.

The original hadoop system will randomly assign tasks to computing nodes and masses the information from native to remote disks whenever the information sets area unit needed.

Prefetching mechanism-

In prefetching mechanism the corresponding computing node that is process as shown in figure two can prefetch following knowledge before hand on his cache with the assistance of prefetching thread as a result of as that the name node provides data to the information nodes so data nodes know from wherever it's to browse the information ,what is the situation of and from wherever it's to require the information for process therefore before finishing the present process data the information node can fetch the information beforehand on its cache. As presently as doable current knowledge task is finished knowledge node can take following task from its native cache and begin process grasp the information node don't got to look forward to data that it want from master node .Prefetching mechanism improves the information process tasks and overhead of underutilized mainframe area unit diminished and overall performance of mapped and reducer tasks area unit exaggerated.



5. Experimental Details

To evaluate the performance of the proposed and prefetching mechanism, Hadoop benchmarks are run on VM ware machine.

RESOURCES	TINY: UP TO 10 HOSTS/ 100 VIRTUAL MACHINES OR EXTERNAL PSC	SMALL: UP TO 100 HOSTS/ 1,000 VIRTUAL MACHINES	MEDIUM: UP TO 400 HOSTS/ 4,000 VIRTUAL MACHINES	LARGE: UP TO 1,000 HOSTS/ 10,000 VIRTUAL MACHINES
CPU	2	4	8	16
Memory	8GB	16GB	24GB	32GB
Disk Space	50GB 10GB (PSC)	100GB	100GB	100GB

Table 2: Minimum configuration required for VMWare Software

CPU	INTEL CORE I 5
MEMORY	2 GB
OPERATING SYSTEM	UBUNTU 14.04
HADOOP	HADOOP VERSION 1.1.2

CPU	INTEL CORE I 5
MEMORY	4GB
OPERATING SYSTEM	WINDOWS 7

Table 3: Minimum configuration required for installing Ubuntu

6. Result

The following experiment has being carried out by using word count example as a reference to calculate how much time is required to execute 2 GB of file by using prefertching mechanism and without using prefetching mechanism.

Contents of	f dire	ctory /	home/outr	outold			
Goto : //home/o	utputol	d	go				
Go to parent d	irector	y					
Name	Туре	Size	Replication	Block Size	Modification	Permission	Owner
_SUCCESS	file	0 KB	1	64 MB	2015-09-23 13:27	rw-rr	abhilas
<u>_logs</u>	dir				2015-09-23 13:00	rwxr-xr-x	abhilas
part-r-00000	file	970.96 KB	1	64 MB	2013-99-23 13:22	rw-rr	abhilas
Go back to DF	S hom	e					
		_					
Local log	IS						

Figure 3: Performance of map reduce engine without using prefetching mechanism.



Figure 4: Performance analysis of map reduce engine using prefetching mechanism

As we can see that without using prefetching mechanism time taken by the map reduce engine to execute 2GB file is 27 minutes and by using prefetching mechanism time taken by map reduce engine was 6 mins. So by using prefetching mechanism we can improve the performance of map reduce engine upto 60%.

7. Conclusion

Map Reduce is an effective programming model for large-scale data-intensive computing applications. Hadoop, an open-source implementation of Map Reduce, has been widely used. The communication overhead from the big data sets' transmission affects the performance of Hadoop greatly. To improve the performance of Map Reduce in heterogeneous or shared environments, a data prefetching mechanism is proposed in this paper, which can fetch the data to corresponding compute nodes in advance.

We have seen that when prefetching mechanism is applied on mapper function the overall performance of hadoop cluster is increased.

Realizing that the expertise switch overhead is brought on by way of the information locality challenge in Hadoop, prefetching mechanism is used to cover knowledge transfer overhead. The prefetching module preloads these future blocks within the cache of the nodes. The proposed Prefetching is prepared to forestall I/O stalls incurred by way of prefetching expertise blocks to be accessed at some factor.

Refrences

[1] J. Dean and S. Ghemawat, "MapReduce: Simplified Data Processing on Large Clusters", Communications of the ACM, vol. 51, no. 1, (2008).

[2] S. Seo, I. Jang, K. Woo, I. Kim, J. S. Kim and S. Maeng, "HPMR: Prefetching and Pre-shuffling in Shared Map Reduce Computation Environment", IEEE International Conference on Cluster Computing and Workshops, (2009) August 31-September 4: New Orleans, USA.

[3] S. Khalil, S. A. Salem, S. Nassar and E. M. Saad, "Mapreduce Performance in Heterogeneous Environments: A Review", International Journal of Scientific & Engineering Research, vol. 4, no. 4, (2013).

[4] J. Xie, S. Yin, X. Ruan, Z. Ding, Y. Tian, J. Majors, A. Manzanares and X. Qin, "Improving MapReduce Performance through Data Placement in Heterogeneous Hadoop Clusters", IEEE International Symposium on Parallel & Distributed Processing, Workshops and Phd Forum (IPDPSW), (2010) April 19-23: Arlanta, USA.

[5] M. Zaharia, D. Borthakur, J. Sen Sarma, K. Elmeleegy, S. Shenker and I. Stoica, "Delay Scheduling: A Simple Technique for Achieving Locality and Fairness in Cluster Scheduling", Proceedings of the 5th European conference on Computer systems, (2010) April 13-16: Paris, France.

[6] Z. Tang, J. Q. Zhou, K. L. Li and R. X. Li, "MTSD: A task scheduling algorithm for MapReduce base on deadline constraints", IEEE International Symposium on Parallel and Distributed Processing Workshops and PhD Forum (IPDPSW), (2012) May 21-25: Shanghai, China.

[7] X. Zhang, Z. Zhong, S. Feng and B. Tu, "Improving Data Locality of MapReduce by Scheduling in Homogeneous Computing Environments", IEEE 9th International Symposium on Parallel and Distributed Processing with Applications (ISPA), (2011) May 26-28: Busan, Korea.

[8] C. Abad, Y. Lu and R. Campbell, "DARE: Adaptive Data Replication for Efficient Cluster Scheduling", IEEE International Conference on Cluster Computing (CLUSTER), (2011) September 26-30: Austin, USA.

Effect of Sisal Fibre Content on the Morphology of Non Recyclable Waste Composite

Savita Dixit¹, Kiran Rohit²

 ¹ Professor ,Department of chemistry ,MANIT Bhopal Madhya Pradesh,India email <u>savitadixit1@yahoo.com</u>
 2 Reserach Scholar, Department of chemistry ,MANIT Bhopal Madhya Pradesh,India

email <u>kiran.obra@gmail.com</u>

Corresponding author Kiran Rohit Email kiran.obra@gmail.com

Abstract

Addition of non recyclable waste plastic (LLDPE: LDPE: BOPP) into sisal fibre as reinforcement is discussed in this study. WMBPs composite were fabricated with sisal fibre with varying % (5,10,15,20) respectively of fibre content by weight. All the samples were made through compression moulding process.SEM analysis showed the fibre matrix adhesion.

Keywords –Natural fibre composites, sisal fibre, BOPP, LLDPE: LDPE,Thermoplastic, SEM.

1.Introduction

Human beings explored uncountable mineral products and other natural resources from the ecosystem to produce consumer goods and construct infrastructures, in the mean time, disposed various wastes and stored them in landfills, which have formed so called urban stocks [1,3]. Plastic, which is synthesized using non renewable fossil resources, is one of the major consumer goods of human society, largely used in urban life and production, including agriculture, commodities, construction industry, manufacturing industry, packaging, etc, therefore, a great amount of plastic wastes were discharged and disposed in the landfills [4,5]. "Landfill mining" was put forward under the concept "sustainable material management", which merge the ideas of "urban solid waste management" and "material cycle" together [1,2]. Landfill mining proposes a feasible approach that excavating the stored wastes out of the old landfills, recycling waste materials, recovering the wastes with high calorie and reclaiming the land and airspace, and landfill mining has been drawing a lot of attention in recent years [6,7 3]. The accumulation of large amounts of waste in nature is a core problem from an environmental perspective. Therefore, the demand for eco-friendly products is constantly increasing. In the search of economically attractive alternatives materials, research groups have been dealing with the preparation of biodegradable materials from natural, low cost raw materials [8]. Natural fibres are available in abundance and inexpensive compared to other relatively advanced man-made fibres .Furthermore, they are renewable and have a low carbon footprint in contrast to their synthetic competitors (i.e. Glass and carbon). The present work entails the use of Sisal fibres as reinforcement for the preparation of composites.

2. Experimental setup

2.1. Composite preparation

Known weight Percentage of sisal fiber was spread between two halves of the compression mold randomly and a load of 20 tons was applied by hydraulic compression press to form a 1.5 mm sheet of sisal fibers. The grind material of LDPE/LLDPE and metallized BOPP film was crushed in a water jacketed agglomerate of M/s. Suresh engineering Works Indore for half an hour. Water was poured in the agglomerator's pop up the hole and the crushed LDPE/LLDPE powder, having a low temperature softening point was converted to lumps while the metallized BOPP film was chopped into smaller size strands. This crushed material was then evenly spread on the bottom part of the Two Plate mold. The size of the mold is 160 mmx 160 mmx 4mm. The compressed sheet of sisal fiber was placed in the middle portion of the mix and further again the crushed material from the Agglomerator was spread evenly on the top layer of the mold cavity. Thus the Sisal fiber sheet prepared was sandwiched between the LLDPE/LDPE and BOPP agglomerate. The hot press was pre-set at 130 ⁰C for the upper half of the Bolster and 130 ^oC for the bottom bolster of the press. The mold was placed between the lower and the upper Bolsters of the hot press and clamped at a tonnage of 40 tonnes for 30 minutes. After 30 minutes the mould was then removed from the hot press and cooled to room temperature. The mould was later opened to remove the composite sheet. Finally a 4mm thick composite sheet was formed.

3.RESULT & DISCUSSION

3.1 Impact strength

The Figure 1 represent the effect of fibers content on the impact strength of LLDPE:LDPE and BOPP reinforced with sisal fibers. The impact strength is +35.3, +37.25, +43.1, +48.7, +53.26 in kJ/m² for 0%, 5%, 10%, 15%, 20% fibers content respectively. It can be noticed that impact strength increases with the increasing fibers content. It is clearly indicated from the graph that impact strength of composites increases with the increase in sisal fibers content up to 15%.



Fig. 1 Effect of fiber content on impact strength of different content of WMBPs

3.2 SEM image of WMBPs after impact test.

It can be observed that there are fibre pullouts and gaps between fibres and matrix at WMBPs- 5.WMBPs-15 the strong fibre/matrix adhesion due particle distribution over the surface.Sisal fibre possess a very good impact strength shown in all fig. strong

bonding of fibre and matrix is noted. Also fibre pull out does not takes place and so result in high impact strength.



Figure. 2. SEM image of WMBPs after impact test WMBPs 5,10,15,20 resp.

Conclusions

The composite with WMBPs 20% fibre showed lower value of impact strength as compared to composite with WMBPs 15% fibre. Hence, it can be concluded that the composite with 15% fibre showed the better impact strength as compared to other composite with varying fibre content WMBPs (5%,10%,20%).From the SEM observation it is clear that the addition of sisal fibre increases the impact strength upto 15% then decrease at 20% due to poor interfacial bonding between the fibre and matrix.

Referneces

[1.] Krook, J., 2010. Urban and landfill mining: emerging global perspectives and approaches.J. Clean. Prod. 18 (16e17), 1772e1773.

[2.]Krook, J., Svensson, N., Eklund, M., 2012. Landfill mining: a critical review of two decades of research. Waste Manag. 32 (3), 513e520.

[3]Krook, J., Baas, L., 2013. Getting serious about mining the technosphere: a review of recent landfill mining and urban mining research. J. Clean. Prod. 55 (15),1e9

[4] Zhang, G., Zhu, J., Okuwaki, A., 2007. Prospect and current status of recycling waste

plastics and technology for converting them into oil in China. Resour. Conserv. Recycl. 50 (3), 231e239.

[5] Al-Salem, S.M., Lettieri, P., Baeyens, J., 2009. Recycling and recovery routes of plastic solid waste (PSW): a review. Waste Manag. 29 (10), 2625e2643

[6] Jain, P., Townsend, T., Johnson, P., 2012. Case study of landfill reclamation at a Florida landfill site. Waste Mangement 33 (1), 109e116

[7] Johansson, N., Krook, J., Eklund, M., Berglund, B., 2013. An integrated review of concepts and initiatives for mining the technosphere: towards a new taxonomy. J. Clean. Prod. 55 (1), 35e44.

[8] Tran P, Graiver D, Narayan R. Biocomposites synthesized from chemically modified soy oil and biofibres. J Appl Polym Sci 2006;102:69–75.

Simulation of Second Order Sigma Delta ADC for

Improving SNR Using OSR with Noise Shaping

Neha Singh Rathaur¹, Rajesh Babu Ahirwar², Indra Kumar Shah³

1SGSITS Indore, nehasinghrathaur@gmail.com 2IES-IPS Academy Indore, rajesh.babu1981@gmail.com 3IES-IPS Academy Indore, indrashah08@gmail.com

Abstract

Sigma delta ADC modulators are the most suitable analog to digital converter for low frequency, high resolution application. Sigma delta ADC also inoculated a clock unit that provided proper timing for the modular and digital filter. This paper describes a simulation of second order sigma delta ADC for improving ADC using OSR with noise shaping emulates the behavior of a second order sigma delta ADC. That will simulate using MATLAB simulink to analyze the performance and the parameter that affects the performance.

Keywords: Sigma delta ADC, SNR, NOISE SHAPING, OSR

1. Introduction

The O- ADC architecture had its origins in the early development phases of pulse code modulation (PCM) systems—specifically, those related to transmission techniques called delta modulation and differential PCM [2]. Delta modulation was first invented at the ITT Laboratories in France by E. M. Deloraine, S. Van Mierlo, and B. Derjavitch in 1946. Ó- ADC works, familiarity with the concepts of oversampling, quantization, noise shaping, digital faltering and decimation is required. Sigma-Delta (S-D) modulation based analog-to-digital (A/D) conversion technology is a cost effective alternative for high resolution (greater than 12 bits). Sigma-delta converters are in wide use among applications that demand high precision and accuracy. Sigma-delta converters break the mutually exclusive relationship between resolution and conversion rate through the use of noise shaping with oversampling or in other words sigma-delta converters are designed so most of the quantization noise power is placed outside of the input signal's bandwidth. The primary component of the sigma-delta ADC is its sigma-delta modulator, which consist of the following: loop filters H(s), one bit ADC (i.e. comparator) that is driven by the output of the filter, a one bit DAC and a summing node. The sigma-delta DAC need not differ conceptually from the sigma-delta ADC: the only difference is that a sigma-delta DAC implements its loop filter in the digital domain rather than the analog domain [16].

Sigma-Delta (S-D) modulation based analog-to-digital (A/D) conversion technology is a cost effective alternative for high resolution (greater than 12 bits). Sigma-delta converters are in wide use among applications that demand high precision and accuracy. Sigma-delta converters break the mutually exclusive relationship between resolution and conversion rate through the use of noise shaping with oversampling or in other words sigma-delta converters are designed so most of the quantization noise power is placed outside of the input signal's bandwidth. The primary component of the sigma-delta ADC is its sigma-delta modulator, which consist of the following: loop filters H(s), one bit ADC (i.e. comparator) that is driven by the output of the filter, a one bit DAC and a summing node. The sigma-delta DAC need not differ conceptually from the sigma-delta ADC: the only difference is that a sigma-delta DAC implements its loop filter in the digital domain rather than the analog domain



Fig. 1S.igma – Delta ADC

2. ADC Parameters

ADC measures on Sample rate, SNR, SINAD, ENOB, THD, OSR, SFDR, Differential non-linearity, Quantization noise, Resolution bits, Dynamic Range, Integral non-linearity, Cost, and mW/Msps.

Signal-to-noise ratio (SNR)

One important performance parameter in an ADC system is the Signal-to-Noise ratio (SNR) which directly affects the Bit Error Rate (BER) of the communication channel. it is define as the ratio of signal power to the noise power.

SNR = 10logPs/Pe db ____10log (22 *(12/8)) =10log (22N) +10 log 3/2 SNR = 6.02n + 1.76dB

Noise shapping-

Sigma delta adc used the concept of noise shapping the in band quantized mini-max if the noise is not shaped then when sampling is done noise shaping depended on order of modulation.

First order- Sigma delta ADC noise shapping

SNR=10log (32 22N) +10 log (32+3)

In this equations can find the daubing the OSR given as SNR Improvement fist order of 9db.

Second order-Sigma delta ADC noise shapping _____ SNR= 10log (32 22N) + 10 log (54+5) _____

Oversampling (OSR)-

Oversampling is the process of sampling signal with a sampling frequency significantly higher than twice the bandwidth. OSR=2

3. Matlab Simulation

For this paper MATLAB SIMULATION environment using the Sigma delta (SD) tool box is used for the simulation of the 2nd order sigma delta ADC WITH NOISE SHAPPING. The Sigma delta toolbox with the post processing function generate the SNR \$ SINAD value and effective number of bits (ENOB) with the varying parameters OSR [8] .The value of OSR is 2n where n increases from 4 to 8 or the maximum range of OSR is 256 for sigma-delta ADC. SNR depends on number of resolution bits, so vary linearly, but SNR is also depending on over sampling ratio. Here the plot for SNR versa over sampling ratio. This graph will linearly for second order sigma delta ADC with increase for each doubling of the OSR.

OSR	SNR	NOISE
		SHAPPING
4	43.34	25.4
8	58.39	40.4
16	73.44	55.4
32	88.49	70.4
64	103.54	85.4
128	118.6	100.4

TABLE-1

4. RESULTS

The results for simulation are shown table1 calculation of SNR with OSR. Second order sigma delta ADC with an oversampling ratio noise shaping. The SNR value change with the change value of OSR .Sigma delta ADC increase for each doubting of the OSR Sigma delta ADC can deliver high performance with low power consumption over signal bandwidth in the MHz range.

References

- [1] Jeffrey H.Reed, James Neel, & Sujayeendar Sachinder,"Analog to Digital & Digital to Analog Conversion", Software Radio.
- [2] Walt Kester Analog Devices "Sigma delta ADC Basics" MT-022.
- [3] James C. Candy and Gabor C. Temes, "Oversampling Methods for A/D and D/A

Conversion IEEE press 1991.

- [4] D.F.Hoeschele ,John wily "Analog-to-digital conversion tech." 1994
- [5] Muhaned Zahim Sujob "Introduction on MATLAB and Simulation ".
- [6] B. Boser, B. Wooley. The design of sigma-delta modulation analog-to-digital converters. IEEE Journal of Solid-State Circuits, vol. SC-23, Dec. 1988
- [7] P.M Aziz, H.V. Sorensen , J.O.V. Spiegel "An overview of sigma delta converters"

IEEE signal processing magazine vol 13, no.1,pp 61-84 jan 1996.

- S. Rapuano, P. Daponte, E. Balestrieri, L. De Vito, S. J.Tilden, S. Max, J. Blair,
 "ADC parameters and characteristics", IEEE In strum. and Meas. Magazine, vol.8, No.5, Dec. 2005, pp.44-54.
- [9] James C. Candy, Gabor C.Temes. "Oversampling Methods or A/D D/A Conversion Over sampling Delta-Sigma Converters," New Jersey, IEEE press, 1992., p. 2-3.
- [10] J.A.Wepman, "Analog-to-digital converters and their applications in radioreceivers", IEEE Comm. Magazine , vol.33-5, May 1995, pp.39-45.
- [11] B.Brannon, "Wideband radios need wide dynamic range Analog Dialogue, vol.29, No.2, 1996.
- [12] R.H.Walden, "Analog-to-digital converter survey and analysis", IEEE Journal on Sel. Areas in Telecomm., vol.17-4, April 1999, pp.539-550.
- [13] IEEE Std.1241-2000, "IEEE Standard for Terminology and Test Methods for Analog-to-Digital Converters", Dec. 2000, pp.4-7.
- [14] E. Rodriguez villagao, M. J. Avedillo "IEEE Trans-on-circuitsand system II Analog and Digital signal processing vol.48 ,pp 102-106 jan 2001.
- [15] L.De Vito, L.Michaeli, S.Rapuano, "Non-linearity correction of ADCs in software radio systems", Proc. of IX IMEKO Int Workshop on ADC Modeling and Testing (IWADC), Sept. 2004, pp. 887-891.
- .[16] E.Zentner, S.Z.Pilinsky, "Software Radio: the best opportunity for the future", Proc. of ELMAR ,Int.Symp.Electr.Marine , June 2005, pp.275-278.

Efficient Hardware Design For An Modulo Adder Based On Residue Number System

Beerendra Patel¹, Ankit kumar Dwivedi², Akhilesh Patel³

1Jaypee University of Engineering & Technology AB road, Raghogarh, Guna(MP)-473226, India beerendrapatel23@gmail.com1
2Assistant Professor, Electronics and Communication Department, School of Research and Technology, People's University, Bhopal, MP, India ankitdwivedi10@gmail.com2
3Assistant Professor, Electronics and Communication Department, School of Research and Technology, People's University, Bhopal, MP, India ankitdwivedi10@gmail.com2

Abstract

In this paper aims to build a novel modulo adder design based on residue number system (RNS), with a pre-specified special set of moduli to simplify the implementation for the purpose of proving the feasibility of its usage. Our design can be divided into three basic components: two conversion modules, and an addition module In this work, we focus on forward conversion (binary to RNS conversion) and Reverse conversion (RNS to Binary conversion). Depending on this notion, each component we implemented individually in VHDL and assemble these component with whole RNS-Adder. The proposed adder compared to existing implementation, offer enhanced operation speed and their regular structure allows efficient VLSI implementation.

Keywords: Residue Number System(RNS), Modulo Adder, Moduli, Forward Converter, and Reverse Converter.

1. INTRODUCTION

The Residue Number System (RNS) is a non weighted number system which speeds up arithmetic operations by dividing them into smaller parallel operations, and they provide interesting low power architecture[1]. It is a non-conventional integer number system whose operations like addition/subtraction and multiplication and division are performed in Parallel. RNS has gained importance during the last decades, because some of the mathematical operations can be divided into sub-categories of sub-operation based on RNS[2].Therefore arithmetic operations can be carried out more efficiently in RNS than in conventional two's complement systems. That makes RNS a good system for implementing variety of applications [3] such as: digital signal Processing (DSP) for filtering for example-computation of inner product, convolution, FFT computation, Fault-tolerant computer systems, communication and cryptography[4]. Residue number systems are also useful in error detection and correction. The modular adder and respective hardware can be further improved if the representation of the operands is considered.

2. Set of Moduli

The best moduli are prime numbers at least from a purely mathematical expression. A particularly useful property of such moduli is that of "generation". If a modulus , m,

is prime, then there is at least one primitive root, p<1m-1, such that the set :{i=0,1,2,3,m-2} is the set of all the non-zero residue. with respect to m. example:- if assume m=5, then we take p=2, since

 $|2^{0}|_{5} = 1, |2^{1}|_{5} = 2, |2^{2}|_{5} = 4, |2^{3}|_{5} = 3,$

Such moduli, multiplication and powering of residues may be carried out in terms of simple operations on indices of the power of the primitive root. It is also useful to have moduli that simplify the implementation of the arithmetic operation.

The arithmetic on residue digits should not deviate too far from conventional arithmetic.



A typical RNS based system is presented. At first the

Fig.1 shows the general structure of RNS Processor

binary to residue converter transforms all weighted binary inputs to their RNS representation with respect to the chosen set of moduli. Then the arithmetic processing is carried out concurrently in every modulo channel. In the final stage the results from the RNS moduli channels are converted back to their corresponding weighted binary representation. This is done by the residue to binary converter.

3. FORWARD CONVERSION

Forward conversion is the process of translating from conventional notation like binary or decimal to residue notation. The basic principle in the computation of residue is division, with the moduli as the divisors. But division as an expensive operation in hardware and is rarely used in the computation of residues, whence the significance of the special moduli. Division is avoidable in the case of other moduli as well, but the hardware required will not be as simple as in the case of the special moduli. Hardware implementations for forward conversion may be based on look-up tables, combinational-logic circuits. Converters for the special moduli-sets are almost always implemented in combinational logic. The complexity of the conversion depends on the moduli set chosen for a specific application.

Let any integer X, Residues are obtained by nominally dividing X by mi. The residue r2 is the easiest compute. r2 is the number represented by the least significant n bits of X.

$$X = x_{3n-1} \cdot x_{3n-2} \cdot \dots \cdot x_{2n} \cdot x_{2n-1} \cdot \dots \cdot x_n \cdot x_{n-1} \cdot \dots \cdot x_0$$

These bits are obtained by shifting to the right by n bits.

In order to determine the residues ,r1 and r3, we must partition X into three n- bits, B1,B2,B3.

$$B_{1} = \sum_{j=2n}^{3n-1} x_{j} 2^{j-2n}$$
$$B_{2} = \sum_{j=n}^{2n-1} x_{j} 2^{j-n}$$
$$B_{3} = \sum_{j=0}^{n-1} x_{j} 2^{j}$$

Then

$$X = B_1 2^{2n} + B_2 2^n + B_3$$

The residue r1 is then obtained as

$$r_{1} = |X|_{2^{n}+1}$$

$$r_{1} = |B_{1}2^{2^{n}} + B_{2}2^{n} + B_{3}|_{2^{n}+1}$$

And for computing r2, is shifting a n-bit which is power of 2, Similarly to compute r3

$$r_3 = |B_1 + B_2 + B_3|_{2^n - 1}$$

4. PROPOSED ARCHITECTURE



Fig.2 Forward conversion

For Example:-



5. MODULO ADDER

In this modulo adder adding two bits using 2 adder and 1 multiplexer. High level designs for modulo-m adders and we shall initially assume that m may be varied.

The result of adding modulo-m, two numbers, A and B, where 0<=A, B<m,



Fig. 3 Modulo-m adder

6. SIMULATION RESULT

7.



Fig. 4 Simulation waveform of modulo-m adder





8. CONCLUSIONS

The major difference between residue arithmetic and standard computer arithmetic are the absence of carry-propogation in the two main operations of addition and multiplication. In modulo-m addition is faster than other arithmetic operation.

References

- 1. K. K. Parhi, VLSI Digital Signal Processing System, John Wiley & Sons Inc., 1999
- 2. Amos Omondi and Benjamin Premkumar, Residue Number System Theory and Implementation, singapore Imperial College Press, 2007, pp. 1-134.
- 3. Behrooz Parhami, Computer Arithmetic Algorithms and Hardware Designs, Oxford University Press, 2000, pp. 60-63.
- 4. Chan Hau Vun and A. B. Premkumar, Senior Member, IEEE "A new RNS based DA approach for Inner Product Computation", IEEE transactions on circuits and system-I vol.60,No.8 August 2013. Benjamin Premkumar, "A Formal Framework for Conversion From Binary to Residue Numbers", IEEE transactions on circuits and systems—II: analog and digital signal processing, vol. 49, no. 2, February 2002.
- 5. Fred J. Taylor, "Residue Arithmetic: IEEE Trans. On computer, pp.50~62, May 1984.
- 6. H.T. Vergos and D. Giorgos, "On modulo 2n+1 adder design," IEEE transaction on computers vol. 61,no. 2 Feb.2012.
- 7. Pedro M. Matutino, "Arithmetic based binary to RNS converter modulo," IEEE Transaction on very large scale integration system, vol. 23,no.3 may 2015.
- 8. Lampros K. and H.T. Vergos, "High speed parallel prefix modulo 2n-1 Adders," IEEE Transactions on computers, vol. 49,no.7, July 2000.
- 9. M.Varun, M. Nagarjuna and M. Vasavi, "Design of high speed modulo 2n+1
- 10. Adder,"International Journal of computer Application vol.81,no. 17 Nov. 2013.

A Fuzzy Logic Based Distributed Voltage Regulator for the Harmonics and Power Sag Improvement in the Power Distribution System

Vishwanath Tiwari¹,Rohit Gupta²

1.Associate Professor & HOD, Department of Electrical Engineering, SORT, People's University, Bhopal, <u>tiwari.vishwanath@rediffmail.com</u> 2.Assistant Professor,Laxmi Narayan College of Technology,Bhopal, <u>rohit0084@gmail.com</u>

Abstract : In this paper a simulation model is considered of a power distribution system were consisting of a PI controlled DVR,DVR (distributed voltage regulator) controls the power sag and harmonics in the distribution system, apart from different compensators only DVR is such a power electronic device which is operated in the power distribution side ,when the controlling aspects are changed in the form of intelligent control system by applying fuzzy logic rules, the complete system on measurement at different loads provided a smooth sinusoidal waves of voltage and current waveforms, also it reduces the power sag to about 21% as expressed in results. The simulation is carried out in the MATLAB were a distribution model is considered.

Measurement Techniques of Leakage and Ground Currents

Sarthak Vishwakarma¹,Neha Paliya²

1 Assistant Professor, School of Research & Technology, People's University,Bhopal, <u>sarthakvishwakarma6@gmail.com</u> 2Assistant Professor, School of Research & Technology, People's University,Bhopal, <u>nehapaliya77@gmail.com</u>

ABSTRACT :Since the early days of power quality analysis, the measurement of low level currents is useful diagnostic tool because this current can cause various problems such as magnetic fields caused by net currents, or safety issues related to leakage currents. This low level current measurement can be done on ground rod, ground conductor, conduit, signal cable and other structure on the other hand the ground current can also effect the infrastructure or equipment. If we find the sources of these current and if we study the nature of these current, we can reduce the ground current which will significantly improves the grounding system.

Minimization of Load Shedding Using Evolutionary Programming Techniques

Sweta Lall ¹, Priyanka Kushwaha²

1.School of Research & Technology, PU,Bhopal, <u>sweta.lall85@gmail.com</u> 2.School of Research & Technology, PU,Bhopal, <u>priyanka.kushwaha17@gmail.com</u>

Abstract: The growing size and worldwide electric industry deregulation complicate an operation of power systems. However, the phenomenal growth in load demand has emerged as a potential challenge to the power system planners and operators. The electricity industry has undergone drastic changes that have significantly affected the energy market. The emergency state may occur in a power system as a consequence of sudden increase of system load, the unexpected outage of a transmission line, a generator, or failure in any of the system components. This state may result in some problems such as line overloading, voltage collapse and angle instability. Load shedding is a usual operation in emergency and extreme emergency states in which the system is driven toward collapse. During an emergency situation, system operators are required to make load shedding decisions based on system security concerns such as voltage, current, power and frequency constraints, to alleviate constraints and maintain system stability. Various different meta-heuristic optimization techniques have been implemented to solve the load shedding problems. This paper summarizes minimization of load shedding during contingency conditions using evolutionary programming techniques. Evolutionary programming has emerged as a useful optimization tool for handling nonlinear programming problems.

Review Paper on Block Truncation Coding for Gray Scale Image using Vector Quantization

Lekhraj Kushwaha¹, Manish Sahu²,

 M Tech Scholor, Department of Electronics & Communication,SORT,PU lekhrajecpcrt@gmail.com
 Associate Professor,Department of Electronics & Communication,SORT,PU manishsahu196@gmail.com

Abstract: In the present era of multimedia, the requirement of image/video storage and transmission for video conferencing, image and video retrieval, video playback, etc. are increasing exponentially. As a result, the need for better compression technology is always in demand. Modern applications, in addition to high compression ratio, also demand for efficient encoding and decoding processes, so that computational constraint of many real-time applications is satisfied. Two widely used spatial domain compression techniques are block truncation coding (BTC) and vector quantization (VQ). BTC method results in good quality image with high bitrate, while the VQ is well known for low bit-rate but produces poor quality images. In further work of this paper is BTC-PF includes BTC algorithm as well as vector quantization method for purpose of pattern fitting for gray and color image.

Smart Grid Security Analysis by Using Artificial Neural Network

Lokesh Shukla¹, Neelam Samkaria², Anu Samkaria³

1 er.lokesh27@gmail.com 2 Neelammohanna@gmail.com 3 ABB, Bangalore <u>anu.samkaria@gmail.com</u>

Abstract: It is an irresistible trend of the electric energy enhancement for developing the smart grid, which applies a large amount of new technologies in power generation, transmission, distribution and utilization to achieve optimization of the power configuration and energy saving. The traditional electrical power grid is currently evolving into the smart grid. Smart grid integrates the traditional electrical power grid with information and communication technologies (ICT). Such integration empowers the electrical utilities providers and consumers, improves the efficiency and the availability of the power system while constantly monitoring, controlling and managing the demands of customers. A smart grid is a huge complex network composed of millions of devices and entities connected with each other. Such a massive network comes with many security concerns and vulnerabilities. In this paper, we survey the latest on smart grid security. We will highlight the complexity of the smart grid network and discuss the vulnerabilities specific to this huge heterogeneous network. We discuss then the challenges that exist in securing the smart grid network and how the current security solutions applied for IT networks are not sufficient to secure smart grid networks. We conclude by over viewing the current and needed security solutions for the smart gird.

Study of Facts Devices for Controlling Reactive Power in Power System

Basheem Saudagar¹, Priyanka Kushwaha², Sweta Lall³

1 UIT, RGPV, BHOPAL, basheems@gmail.com 2 School of Research & Technology, Pu, Bhopal, Priyanka.pcrt17@gmail.com 3 School Of Research & Technology, Pu, Bhopal, <u>swetha.lall85@gmail.com</u>

Abstract: This paper provides a way to design a TCR (Thyristor Controlled Reactor) employed in SVC (Static VAR Compensator) for improving the power quality by reducing harmonics contents. Most electrical distribution systems are incurring large losses as the loads are wide spread, inadequate reactive power compensation facilities and their improper control. Flexible AC transmission system (FACTS) devices can be a solution to these problems. It is established how the delta connected TCR minimizes the harmonic components and the operating range for various electrical quantities as a function of firing angle is investigated. Simulation result carried out and by Matlab/Simulink verifies the performance of proposed method.

Study and Method to Reduce Knocking In SI Engine

Faisal Jawed Khan¹, Bhupendra Koshti², Pushkar Dwivedi³

 Research Scholar SORT, People's University faisaljawedkhan.1991@gmail.com
 Asso. Professor, Department Of Mechanical Engineering, SORT, People's University, bhupendra.koshti@yahoo.in
 Asst. Professor,Department Of Mechanical Engineering, SORT, People's University, Pushkar.dwivedi@gmail.com

Abstract: Knocking in Spark ignition engine is an abnormal combustion phenomenon which can affect the engine performance and thermal efficiency. This paper systematically reviews the engine knock phenomenon, including the mechanisms and detection methods. In this paper, we can study about how can reduce the knocking in SI engine by using Octane Number(ON). By definition, nheptane has an octane value of zero and iso-octane has a value of 100. The higher the ON, higher the resistance of knock. Also in high compression engine, we can use high octane fuel to avoid self ignition and knock. Two methods can also use for measuring ON. Such as RON and MON, these are relates to low speed and high speed engine operation respectively. High octane fuels can be produced by the use of Anti-knock additives. Such as Tetraethyl lead(TEL) and Tetramethyl lead(TML). Organo-manganese and alcohols are substitutes of TEL. Ethanol in petrol are called to enhance the octane number, and are recognized worldwide as a proven octane enhancer. Adding ethanol to gasoline improve its performance by raising its octane rating. Some aromatics like Toluene and Xylene can also used as an anti-knock additives. Finally, this paper can highlighted the basic problem related with knocking in SI engine and give some suggestions to reduce it.
A Study for Potential Estimation Using Renewable Energy Technologies for Domestic Cooking In India for Rural Development

Sushil Kumar Kushwaha¹ Mr.Shashikant Sharma² Raji N. Mishra³

1 Research Scholar, SORT, Peoples University Bhopal. 2 Associate Professor, Dept. of Mechanical Engg. SORT Peoples University Bhopal.

Abstract: An attempt has been made to estimate the potential of using biogas plants, solar cookers and improved cook stoves for domestic cooking in India. Based on 1991 statistics on the bovine population and ownership pattern, the potential number of family size biogas plants comes out to be around 38 million in the optimistic scenario whereas, in the realistic scenario it is around 29 million. The potential of improved cook stoves is estimated at about 90 million and that of solar cookers is estimated at about 75 million.

Analysis of Ballizing Parameters Super Finishing Ballizing Process for Evaluation of Different Forces

Pawan K. Upadhyay

Department of Mechanical Engineering, CIST, Bhopal, <u>pkudonn@gmail.com</u>

Abstract: The burnishing process help to improve surface roughness super finishing. This process is easy to apply because it is made in the machine itself where the piece has been mechanized, through the use of a tool and without having to dismantle the piece, is the operation of Ballizing. This will lead to discovery of important parameters (for force evaluation) on surface to engineer to achieve desired goals of centre line average values etc. The hole to ballized is similar in diameter to that of the ball. When over sized ball is forced through an under sized hole, the diameter of the ball temporarily increases.

This increase in hole diameters is approximately equal to interference between the ball and the hole. Part of the expansion is due to force, the wall will spring back by the same amount after the ball has passed through the entire length. However a part of the increase in diameter is also permanent which is caused due to displacement metal, parallel to the axis of hole by virtue of plastic flow. Ballizing is the plastic deformation due to force of a surface due to Ball moving in internal surface. A simple tooling such as a hardened ball and push road is required for this process .As the forces required are excessive, Tensile testing machine .The material of the ball is so selected that it is not deformed. (Interference between the ball and the hole). In general, Hardened steel balls are used for low carbon, or medium carbon steel bushes, Aluminum Alloy bushed and the same hardened steel ball combinations, for sizing and finishing holes in metal components. A suitably oversized precision ball is pressed through an unfinished undersized hole, however an intensive analysis is

essential for analyzing the mechanics of the process. Mathematical models incorporating the effect of force, hardness of work piece on the surface finish improvement are essential for a thorough evaluation of forces

Ballizing may occur on any sliding surface if the contact force per unit area locally exceeds the yield strength of the material. Ballizing, is the simple case of a hardened ball on a cylindrical surface. If the ball is pressed directly into the cylindrical hole, force per unit area develop in both objects around the area where they contact. As this normal force increases, both the ball and the tabular (cylindrical) surface deform. In Ballizing process the outer surface layer is compressed by the application of highly polished and hardened metallic tool. The process of finishing metal, is carried out by plastic deformation due to force at the surface only. It does not improve the surface finish only but it enhances the mechanical property of the surface hardening. The fatigue strength due to residual compressive force on the surface, also increases.

Ballizing of external surfaces is carried out by one or a series of balls and balls made of hard materials, such as alloy steels, diamonds, carbide etc. The surface is machined with a definite pressure force. Although pressure force is needed for Ballizing, but too much of pressure force may result in grooving or rubbing off the metal. The best combination of half rubbing and half rolling action is provided by round steel balls and as such round steel balls are considered the most satisfactory Ballizing agent. The balls should be spherical. They should be hard, smooth and too tough to fracture. Ballizing is a Technique of cold working metal surfaces to induce compressive residual force per unit areas and enhance surface roughness qualities. The tooling typically consists of a hardened sphere or cylindrical ball. These tools are pressed into/across the part being processed. The part (or the tool in some applications) must be moving at a constant rate of speed, for example in the case of Ballizing a part on a lathe, the part is spinning(moves) and the Ballizing tool is moved across the surface as a constant rate therefore producing a very consistent finish across the part. Another application is thrust (force) bearing surfaces of some production crankshafts. A dual ball (tool) is moved into the thrust bearing journal of a crankshaft, while the crankshaft is spinning the tool is indexed (so each ball is perpendicular to the thrust surface while backing each other up) deforming the surfaces. So the diameters of each ball added together -compensated for elastic deformation) equals the finish dimension of the thrust bearing. The Ballizing process is made with the intention of improving the surface finish of some pieces that have been previously mechanized. The results of the tests carried out this process applied to Aluminum Alloy and Mild's steel. The ball is typically forced entirely through a hole in a second or less so the production rate depends on hole quickly parts can be loaded and unloaded. Alter exiting the hole, the ball can be captured in a small cup or a trough below the work table. Although ballizing can be manually performed in an arbor press, drill press, mill or lathe, automated equipment is available as CNC machine. Ballizing is not only appropriate for through-holes. Special techniques described later are available for blind-hole application. Mechanics of Ballizing & effect of Ballizing parameters (for force evaluation) on force. Such improvement could be explained at the light of the nature of depth of penetration. Outer surface strains were proportional to the depth of penetration and also optimization was observed for both speed and feed.

Analysis of Semi-Circular Transverse Rib's Roughened Solar Air Heater with Diferent Diameter Using CFD

Rishi kumar Ahirwar¹, Yogesh Parkhi²

1 Research Scholar, Department of Mechanical Engineering, SORT, Bhopal, India (<u>Email-rishibamoriya @gmail.com</u>) 2Associate Professor in Department of Mechanical Engineering, SORT, Bhopal, India (Email- Yogeshparkhisati@gmail.com)

Abstract: This work is present for a detailed investigation of theanalysis of semicircular transverse ribsroughned solar air heater with different diameter. In this work asolar air heater consist semi-circular transverse ribs roughness on the absorber part of the solar air heater by using the application of computational fluid dynamics (CFD). In this Solar air heater an absorber plate is made of 'Al' and roughened with semi-circular sectioned transverse ribs with different -different diameters due to these ribs turbulence is created in the flow of fluid (air). Turbulence of fluid increase the heat transfer from absorber plate to the fluid. The amount of heat transfer is mostly depend on Friction factor &Nusselt number and they depend on pressure drop& surface heat transfer coefficient 'h' respectively.By CFD analysis of solar air heater pressure drop & Surface heat transfer coefficient &are computed. These parameter pressure drop & heat transfer coefficient.

Applications of Nanotechnology in Future Automobiles

Inder Singh Nagar ^{*1}, Bhupendra Koshti ² Ashwin Bhaisare³

¹School of Research & Technology, Peoples University, Inderpcrt@Gmail.Com
²School of Research & Technology, Peoples University, Bkpkoshti33@Gmail.Com
³LNCT Bhoapl (M.P), <u>Ashwin.Bhaisare@Gmail.Com</u>

Abstract: Industry is certainly no exception. Nano-enhanced materials are already beginning to improve the performance and cost-effectiveness of vehicles, and this effect will only increase in the coming years, as harder, stronger, lighter nanomaterials become commercially available.

The industry's overarching development goals are to improve fuel consumption, environmental impact, safety, and comfort, as continually growing car use conflicts with environmental pressures and infrastructure limits. Nanotechnology will undoubtedly play a huge role in the way automotive manufacturers deal these changes. This paper focuses on some of the automotive applications for nanotechnology and showcases a few of them that are believed to have the highest probability of success in this highly competitive industry. No discussion of nanotechnology is complete without touching upon its health and environmental implications. This paper addresses some of the safety issues and the precautions that we as an automotive industry need to take in the production, processing, storage and handling of such minute particles. The goal of this paper is to raise the awareness on the promise of nanotechnology and the potential impact it will have on the future of the automotive industry.

Bio-Diesel Production from Waste Cooking Oil with Factor Affects to Its Formation

Abdul Karim Chaudhary¹, Dr.Keshavendra Choudhary², Shashikant Sharma³

1 Research Scholar, Department of mechanical engineering ,SORT Peoples University. 2 Principal& professor SORT Peoples University. 3 Associate professor Department of mechanical engineering ,SORT Peoples University. <u>akc3582@gmail.com,hoi.engg@peoplesuniversity.edu.in</u> shashikant.sharma313@gmail.com

ABSTRACT: Waste cooking oil which contain large amount of fatty acids are collected by the environmental protection in many parts of the world. Continuous use of petroleum sourced fuels is now widely recognized as unsustainable because of depleting supplies and the contribution of these fuels to the accumulation of carbon dioxide and carbon monoxide in the environment. Renewable, carbon neutral, transport fuels are necessary for environmental and economic sustainability. The aim of work, biodiesel was extracted double stage trans-esterification process from waste cooking oil and to study the performance and emission characteristics of diesel engine.

In this study, waste cooking oil was used to extract the bio-diesel. The extracted bio diesel was blended with sole fuel and B20% blend (20% of bio diesel + 80% of diesel) has been selected. From literature review, it is understood that B20% blend the engine can run without any modification in the operational parameters and enhance the performance of the engine with bio-diesel. From the experimental investigation it was observed that the brake thermal efficiency increased for B20% blend by 1.5% when compared to that of conventional diesel fuel. The CO, HC, Smoke were found to

bone." The alcohol breaks off the three fatty acid chains from the glycerine and then attaches to each of the three free fatty acid chains making a fatty acid ester, decrease with the B20% blend with slightly increase in NO_x emission compared to that of sole fuel.

Design and Implementation of Offgrid Solar PV at the Roof Top of Truba Building

Aaditya Singh Tomar¹, Vaibhav Singhai²

1h.No. 29, Rishaldhar Colony Chola Road, Bhopal (<u>aadibbps@gmail.com</u>) 2vidhya Nagar, Hoshangabaad Road, Bhopal (<u>vaibhavsinghai647@gmail.com</u>)

Abstract: Installation of solar harnessing device on the roof top which is echo friendly and enlightens the institute building. By generating and utilizing the electrical power generated by the solar panel we are trying to reduce load on coal power generation plant so as to save environment and sustainably develop.

Numerical Simulation of Scram-Jet Combustor using Double wall Injector

Dharmendra Kumar¹ Dr. Keshavendra Choudhary²

1. M.Tech. Scholar Mechanical Engg. Dept., SORT, People's University, Bhopal 2. Principal & Professor, SORT, People's University, Bhopal

Abstract: Development of efficient supersonic combustion ramjets (scramjets) is crucial for realizing practical high speed flight within the atmosphere. The main focus of study is to understand the fuel injection, fuel–air mixing, combustion in the high velocity and high enthalpy flow environment. However this progress is encouraging, a renewed interest in low-cost, reliable and environmentally responsible access to space has identified scramjets capable of accelerating to speeds as high as Mach 12 is desirable. One class of scramjets thought to be capable of hypervelocity performance are those that employ three-dimensional stream traced compression inlets to efficiently compress captured air. One promising example of this type of scramjet is the- Rectangular-to-Elliptical Shape-Transitioning (REST) engine. To meet these aims, the engine was studied both numerically and experimentally.

Performance Evaluation of Power Saving Mechanism in IEEE 802.16e Mobile WiMAX

Manish Sahu¹, Rahul Pandey², Deepti Agrawal³

 1Associate Professor in Department of Electronics & Communication, SORT <u>Manishsahu196@gmail.com</u>,
 2Assistant Professor in Department of Electronics & Communication, SORT rajblue777@gmail.com
 3 Associate Professor in Department of Electronics & Communication, SORT er.deeptiagrawal@gmail.com

Abstract: IEEE 802.16 is a best broadband wireless access standard. Quality of service (QoS) guarantee and power saving are two important factor in IEEE 802.16e. IEEE 802.16e standard defines sleep mode operation for different power saving classes. Our goal is to find out the factors in which energy consumption of mobile device depends. so we used ns-2 simulator, And compared different varying factors which affect sleep mode operation in WiMAX networks as speed, application, distance and number of nodes, And measured the effect of it on the energy consumption of mobile device in transmit as well as receive mode.

Adaptive Channel Estimation Technique in MIMO-OFDM System for LTE Uplink

Vyomkesh Singh Mourya¹, Kavita Thakur²

 PG Scholar Department of Electronics and Communication, Peoples University vyomkeshmourya@gmail.com
 Asst. Professor Department of Electronics and Communication, Peoples University thakurkavita0512@gmail.com

Abstract: Third generation partnership project (3GPP) long term evolution (LTE) uses single carrier frequency division multiple access (SC-FDMA) in uplink transmission and multiple input multiple output orthogonal frequency division multiple access (MIMO-OFDM) scheme for the downlink. A variable step size based least mean squares (LMS) algorithm is formulated for a single carrier frequency division multiple access (SC-FDMA) system, in its channel estimation (CE). From the simulation, it is found that the convergence speed of the NLMS algorithm is faster than the RLS and LMS algorithm.

Demonstration of Y-junctions Waveguide Using Photonic Crystal

Akhilesh Patel¹, Beerendra Patel², Ankit Kumar Dwivedi³

 Assistant Professor, Electronics and Communication Department, SORT, People's University, Bhopal, M, India <u>akhilesh.patel90@yaho.com1</u>
 Ph.D. Scholar, Electronics and Communication Department, JayPee University, Guna, beerendrapatel23@gmail.com2
 Assistant Professor, Electronics and Communication Department, SORT, People's University, Bhopal, MP, India

ankitdwivedi10@gmail.com3

Abstract: A highly efficient Y-junction based on a planar photonic crystal (PhC) platform is presented. The PhC consists of a triangular array of holes etched into a GaAs/AlGaAs heterostructure, with a typical period of 322 nm and ~35% fill factor. The Y-junction has smaller holes positioned at the centre of the junction, giving rise to very uniform splitting and high transmission. The performance is very encouraging, with experimental transmission of approximately 40% for each arm of the Y-splitter relative to a comparable single-defect PhC waveguide.

Design and Simulation of Triple Band Micro-strip Patch Antenna

Kavita Thakur¹, Divya Rai², Gaurav Morghare³

1 Asst. Professor Department of Electronics and Communication, Peoples University, Bhopal thakurkavita0512 @gmail.com

2 Asst. Professor Department of Electronics and Communication, Peoples University, Bhopal divyaraia@yahoo.co.in

3 Asst. Professor Department of Electronics and Communication, Oriental Institute of Science & Technology, Bhopal, thakurkavita0512@gmail.com

Abstract: In this paper, a triple band micro strip patch with rectangular and double E slotted has been designed and simulated. It is triple band antenna, which operates at three resonant frequencies 1.39, 1.91 & 2.39 GHz, which is a different miniaturizes patch with multi-band. In this design, we have used micro strip feeding using FEKO simulation software. By this unique design and combination of this feeding good results like return loss, VSWR and bandwidth are obtained. For this design of micro strip antenna FR-4 substrate (permittivity=4.4) with thickness 1.6 mm, loss tangent is 0.02 are taken. FEKO simulation software has used for designing and electromagnetic analysis. It has been observed that using triple slotted patch antenna with micro strip at center feed, can get better return loss, VSWR, bandwidth and multiband.

Analysis on OFDM LTE System

Shail Singh Thakur¹, Kavita Thakur²

¹ MTech, Department of Electronics Science, Rewa. <u>thakur600@gmail.com</u> ² Asst. Professor Department of Electronics and Communication, Peoples University, Bhopal <u>thakurkavita0512@gmail.com</u>

Abstract - Orthogonal Frequency Division Multiplexing (OFDM) and Multiple Input and Multiple Output (MIMO) are two main techniques employed in 4 th Generation Long Term Evolution (LTE). In OFDM multiple carriers are used and it provides higher level of spectral efficiency as compared to Frequency Division Multiplexing (FDM). In OFDM because of loss of orthogonality between the subcarriers there is intercarrier interference (ICI) and intersymbol interference (ISI) and to overcome this problem use of cyclic prefixing (CP) is required, which uses 20% of available bandwidth. Wavelet based OFDM provides good orthogonality and with its use Bit Error Rate (BER) is improved. Wavelet based system does not require cyclic prefix, so spectrum efficiency is increased. It is proposed to use wavelet based OFDM at the place of Discrete *Fourier Transform (DFT) based OFDM in LTE. We have compared the BER performance of wavelets and DFT based OFDM.*

Smart Antenna for High Speed Wireless Communication

Deepti Agrawal¹, Manish Sahu², Rahul Pandey³

Associate Professor in Electronics & Communication Dept SORT, PU Bhopal Er.deeptiagrawal@gmail.com 2 Associate Professor in Electronics & Communication Dept SORT, PU Bhopal Manishsahu196@gmail.com 3 Assistant Professor in Electronics & Communication Dept SORT, PU Bhopal Raiblue777@gmail.com

Abstract: Smart antenna techniques are new in the area of wireless communication, the technology itself was introduced back in 1960's. Early smart antenna technology was deployed in military communication systems, where narrow beams were used in order to avoid interference arising from noise and other jamming signals. Until recently, the use of smart antennas had been limited to military applications. But performance gains in cost-effective RFIC (Radio Frequency Integrated Circuit), digital signal processing, and improved algorithms have extended the smart antenna concept into commercial wireless communication industry At millimeter wave frequencies, it is possible to expect increased system performance through the use of smart antenna configurations associated with some signal processing capabilities. The analysis and design of intelligent antenna arrays for millimetre wave systems applications can be undertaken using different technologies and techniques but a new and powerful approach using CPW (coplanar waveguide) fed microstrip antennas offer some supplementary alternatives. A theoretical approach supported by both numerical and experimental results obtained for different configurations and frequencies will be presented and the fit of these results with desirable design values will be further discussed.

Design of a Reconfigurable Arbiter Using AMBA AHB Protocol

Vimlesh Kumar Sahu

Department of Electronics & Communication Engineering, SORTBHOPAL Vimlesh.sahu@gmail.com

Abstract: -The SOC design paradigm relies on well-defined interfaces and reuse of intellectual property (IP). Because more and more IPs are integrated into the design platform, the amount of communication between the IPs is on the increase and becomes the source of the performance bottlenecks. The arbiter plays a very important role to manage the resource sharing on the SOC platform. This paper presents a reconfigurable arbiter with various combinations of arbitration algorithms. The performance analysis for the various combinations of the arbitration algorithms under different traffic loads is simulated. The reconfigurable arbiter was implemented by FPGA and synthesized by Synopsys Design Complier with a TSMC 0.18 µm cell library. In addition, the power analysis of the reconfigurable arbiter at various arbitration states is reported. Bus-based system-on-chip (SoC) design becomes the major integration methods for shorting design cycle and time-to market, thus how to verify IP functionality on bus protocol is challenge. Traditional simulation-based bus protocol monitor scan check bus signals obey bus protocol or not, but they often lack of efficient debugging mechanisms .We propose a rule based bus protocol checker, it contain ns 73 related bus protocol rules to check bus signal behavior, and two corresponding debugging mechanism to shorten debugging times. Error reference table can summarize design under tests (DUTs) have been violated; Windowed trace buffer can capture multiple errors' history data that helps designer debug efficiently

High Speed Area Efficient Linear Convolution using Unsigned and Signed Multiplier

Aimen Choudhary¹, Deepti Agrawal²

¹P.G Scholar, Department of Electronics& Comm., SORT, Bhopal ¹aimenchoudhary@yahoo.com 2 Associate Professor Department of Electronics&Comm., SORT Bhopal <u>er.deeptiagrawal@gmail.com</u>

Abstract: In this Technical era the high speed and low area of VLSI chip are very-very essential factors. Day by day number of transistors and other active and passive elements are drastically growing on VLSI chip. All the processors of the devices adders and multipliers are played an important role. Adder is a striking element for the designing of fast multiplier. Ultimately here need a fast adder for high bit addition. In this paper, the implemented of linear convolution are based on common Boolean logic and baugh multiplier. Proposing common Boolean logic (CBL) adder provides less components, less path delay and better speed compare to other existing CBL adder and other adders. Here we are comparing the linear convolution of different-different word size from other adders. The design and experiment can be done by the aid of Xilinx 6.2i Spartan device family.

Survey Paper on Fingerprint Image Enhancement and Minutiae Extraction Techniques

Ripu Raj¹, Divya Rai²

1P.G Scholar, Department of Electronics& Comm., SORT, Bhopal 2 Assistant Professor Department of Electronics&Comm., SORT Bhopal 1raj.ripu11@gmail.com,2 divyaraia@yahoo.com

Abstract: Human fingerprints are rich in details called minutiae, which can be used as identification marks for fingerprint verification. The goal of this project is to develop a complete system for fingerprint verification through extracting and matching minutiae. To achieve good minutiae extraction in fingerprints with varying quality, preprocessing in form of image enhancement and binarization is first applied on fingerprints before they are evaluated. Many methods have been combined to build a minutia extractor and a minutia matcher. So we need a preprocessing technique to decrease the number of minutiae points and to get only those points that can be further used to match the fingerprint. According to experimentation results, we can decrease the number of fallacious minutiae points to a very large number by using preprocessing.

RFID Technology for Supply Chain Application

Manoj Singh Tomar¹, Divya Rai², Akhilesh Patel³

 1Associate Professor in Electronics & Communication Dept SORT, PU Bhopal, India manojsinghtomar@yahoo.com
 2Associate Professor in Electronics & Communication Dept SORT, PU Bhopal, India divyaraia@yahoo.com
 3Assistant Professor in Electronics & Communication Dept SORT, PU Bhopal, India Akhilesh.patel90@yahoo.com

Abstract: The purpose of this paper is to investigate the actual benefits of radio frequency identification (RFID) on supply chain performance. Radio Frequency Identification (RFID) is a true next-generation technology — ready, available and being implemented today — that is transforming how companies manage and extract more business value from their supply chain operations. For retailers, RFID can reduce stockouts, improve inventory accuracy, increase sales and speed up goods receipt. Benefits for logistics providers include improvements in receiving, shipping and inventory control processes and various yard management activities. Manufacturers have used RFID to design more efficient production systems, increase capacity, decrease lead time, curtail theft and reduce tool expenditure. Forward and closed-loop supply chains have also benefited from RFID implementations.

PTS based MIMO-OFDM System using Space Frequency

Block Coding Technique

Rahul Raikwar¹, Yash Kshirsagar², Akhilesh Patel³

1M Tech Scholor, Department of Electronics & Communication,SORT,rahulraikwar2404@gmail.com 2 Associate Professor,Department of Electronics & Communication,SORT <u>yash.kshirsagar005@gmail.com</u> 3Associate Professor,Department of Electronics & Communication,SORT akhilesh.patel90@yahoo.com

Abstract: In this paper, the review of the multiple input multiple output using space time block code on WiMAX (IEEE 802.16) system. The Worldwide Interoperability for Microwaves Access technology which can offer high speed voice, image, and video and data service up to base on standard 802-16 wireless MAN is configured in the same way as a traditional cellular network. The range of WiMAX makes the system very attractive for users, but there will be slightly higher BER at low SNR.

An Improved Spectrum Sensing Technique using Matched Filter Detection with a NP Observer

Rahul Pandey¹, Deepti Agrawal², Manish Sahu³

1,2,3 Dept. Of Electronics & Communication, School Of Research & Technology, PU Bhopal

Abstract: The growing demand of wireless applications has put a lot of constraints on the usage of available radio spectrum which is a limited and precious resource. Some frequency bands in the spectrum are largely unoccupied most of the time and some other frequency bands are partially occupied. This underutilization of radio spectrum is minimized by using the Cognitive radio[1]. An important requirement of the Cognitive Radio is to sense the spectrum holes. The spectrum sensing function enables the CR to adapt its environment by detecting the primary users that are receiving data within the communication range of CR user. We can find various spectrum sensing techniques [1-2] which, in general could be classified as energy based sensing, matched filter-based sensing, cyclostationary feature-based sensing and so on. Different techniques serve different purpose based on their advantages and disadvantages. The matched filter-based detect gives better detection compared with the other methods; however, it requires complete signal information.

In this paper, we proposed a new approach of matched filter- based spectrum sensing with a Neyman-Pearson observer and we observed that, this approach gives better probability detection and threshold values than the matched filter-based spectrum sensing with a Log-Likelihood Ratio test.

Review of high density Salt and Pepper Noise Removal by Median Filter

Rahul Kumar¹, Vimlesh Kumar Sahu²

 1P.G Scholor, Department of Electronics& Comm., SORT, Bhopal rahulbits54@gmail.com
 2 Associate Professor Department of Electronics&Comm., SORT Bhopal vimlesh.sahu@gmail.com

Abstract: Noise removal is one of the greatest challenges among the researchers, noise removal algorithms vary with the application areas and the type of images and noises. Noise can degrade the image at the time of capturing or transmission of the image. Before applying image processing tools to an image, noise removal from the images is done at highest priority. Ample algorithms are available, but they have their own assumptions, merits and demerits. The kind of the noise removal algorithms to remove the noise depends on the type of noise present in the image. In this paper, light is thrown on some important type of noise and a comparative analysis of noise removal techniques is done. This paper presents the results of applying different noise types to an image model and investigates the results of applying various noise reduction techniques.

Review Paper on IEEE 754 Floating Point Multiplier Using Modified CSA

Bhupendra Singh Solanki¹, Manoj Singh Tomar²

 1P.G Scholar, Department of Electronics& Comm., SORT, Bhopal bhupendra.s0217@gmail.com,
 2 Associate Professor Department of Electronics&Comm., SORT Bhopal manojsinghtomar@yahoo.com

Abstract: Due to advancement of new technology in the field of VLSI and Embedded system, there is an increasing demand of high speed and low power consumption processor. Speed of processor greatly depends on its multiplier as well as adder performance. In spite of complexity involved in floating point arithmetic, its implementation is increasing day by day. Due to which high speed adder architecture become important. Several adder architecture designs have been developed to increase the efficiency of the adder. In this paper, we introduce an architecture that performs high speed IEEE 754 floating point multiplier using modified carry select adder (CSA). Modified CSA depend on booth encoder (BEC) Technique. Booth encoder, Mathematics is an ancient Indian system of Mathematics. Here we are introduced two carry select based design. These designs are implementation Xilinx Vertex device family.

Design of Encoder and Decoder for Golay code

Shubham Shrivastava ¹,Rahul Pandey²

M.Tech Scholar, Department of Electronics and Communication, SORT Peoples University sbam3293@gmail.com

Asst. Professor, Department of Electronics and Communication, SORT Peoples University,

rajblue777@gmail.com

Abstract: This paper is based on cyclic redundancy check based encoding scheme. High throughput and high speed hardware for Golay code encoder and decoder could be useful in digital communication system. In this paper, a new algorithm has been proposed for CRC based encoding scheme, which devoid of any linear feedback shift registers (LFSR). In addition, efficient architectures have been proposed for both Golay encoder and decoder, which outperform the existing architectures in terms of speed and throughput. The proposed architecture implemented in virtex-4 Xilinx power estimator. Although the CRC encoder and decoder is intuitive and easy to implement, and to reduce the huge hardware complexity required. The proposed method it improve the transmission system performance level. In this architecture our work is to design a Golay code based on encoder and decoder architecture using CRC generation technique. This technique is used to reduce the circuit complexity for data transmission and reception process.

A Novel Technique of Data Caching using Artificial Neural Network in Mobile Environment

Pankaj Savita¹, Siddharth Pandey², Madhulika Goswami³

1<u>e.pankajsavita @gmail.com</u> 2 siddharth6862 @gmail.com 3 madhu.priya108 @gmail.com

Abstract: In recent years mobile computing has become emerging technology which provides mobile to access information anytime and anywhere. Mobile computing paradigm support location dependent services in most popular way. Data management is a critical issue in mobile environment. Data caching plays an important role in improving these services and system performance. When large number of mobiles involve in communication, they requests to access the data from the data base simultaneously. This Simultaneous data access requests increase network Traffic and thus poor response time from server. Due to the limited cache size in mobile devices, the main problem in data caching is cache replacement which is finding a suitable subset of items for removing from cache memory. In this paper, we have analyzed the role and various factors affecting the behavior of cache performance in mobile computing environment.

An Efficient Technique for Intrusion Detection System to Improve the Detection Rate Using ANN Technique

Aakanksha kori¹, Harsh Mathur²

Department of Computer Science and Technology, IES Group of Institution, Bhopal, India

Abstract: Nowadays, security of computer network has become major problem in most of everyone's lives. Intrusion Detection Systems monitor computer system to find out sign of security violations over network. When IDSs detects such sign triggers it has to report them to generate the alerts. These alerts tell the user about intruders. The alerts are presented to a human analyst then human analyst evaluates those alerts and initiates an adequate response. In Practice, IDS observe numbers of attacks per day. It also has to deal with different types of attacks. When IDS deals with network intrusions one of the important concerns is to generate true alarms, it means sometime it mistakenly generate an alarm for a legitimate user. Various soft computing techniques are used in Intrusion Detection System. In this paper, we propose a new approach such as Growing Self Organizing Map Algorithm for helping IDS to attain higher detection rate. The proposed approach is performed to detect intrusion has happened or not.

Performance Simulation of A Parabolic Trough Solar Collector Solar Energy

Md Tahir Hussain¹, Shashikant Sharma²

1 Research Scholar Sort, People's University. Bhopal <u>tahir731974@gmail.com</u> 2 Assosiate Professor, Department of Mechanical Engineering Sort, People's University, Bhopal <u>shashikant.sharma313@gmail.com</u>

Abstract: In modern day life each and every activity of human being is sophisticated by means of advanced invention. In this context energy requirement is peaking every day, most of the technologies and energy sources (mostly non renewable) which are all in practice to meet our energy requirements are causing environmental concerns and the present day demands may lead to fuel scarcity in the future.

To overcome those things we need to go for effective alternative sources. One such alternative is the solar energy. Solar energy is produced by the sun and is available in all regions of the earth.

This project reviews the solar parabolic trough collector along with the different heat absorbers which enhances the heat absorption capacity of the collector. The objective of the project is to understand the various parameters and equations related to the flat plate collector and the concentrating collector. The project mainly aims at using two other modified absorbers in the concentrating collector and to analyze the performance and thermal efficiency of those modified concentrating collector systems.

Implementation of Solar Energy in Existing Thermal Power Plant

Yogesh Parkhi¹, Richa Thakur^{2*}, Hemant Jain³

¹Associate Professor, ²Assistant Professor, 1,2 Department of Mechanical Engineering. SORT Bhopal <u>yogeshparkhisati@gmail.com</u>, <u>tricha04@gmail.com</u> 3 Sr. Research Associate, CSIR-AMPRI, Bhopal <u>hemantjain.jain03@live.com</u>

Abstract: Energy is a basic requirement for every sector of economic development in a country. As a result, energy demands have been steadily increasing along with the growth of human population and industrialization. Common sources of energy are coal, natural gas and petroleum from fossil fuels. This growing consumption of energy has rapidly depleted non-renewable sources of energy. Rising price of fossil-based fuels and potential shortage in the future have led to a major concern about the energy security in every country. In the present case study we have reduced the consumption of coal by 450 kg/24hr by rising the temperature of DM feed water (make up water) from 35 °C to 80 °C by use of solar energy in solar water heater (Evacuated tube type). Solar water heater can be implemented in any weather condition for thermal power plants for reducing the cost of sensible heat of makeup water; as a result the fuel consumption will be reduced. It can be used as an accessory of thermal power plant. In India, 80% of mining is in coal and its accounts for 55% of India's energy need. Coal has been a major contributor in providing energy security of our country, but it is not a renewable resource; one day it will exhaust. Solar energy is a part of non-conventional source of energy. Also this energy is available in abundance limit. There are many disadvantages of using fossil-based fuels, such as atmospheric pollution and environmental issues. Fossil fuels emissions are major contributors of greenhouse gases which may lead to global warming. Combustion from fossil fuels is major source of air pollutants, which consist of CO, NOx, SOx, hydrocarbons, particulates and carcinogenic compounds. The Present Work is done on obtained parameters of 31MW Thermal power plant (HEG Bhopal). Solar water heater of evacuated tube type is a good alternative for increasing the efficiency of thermal power plant& to reduce the consumption of fossil fuel.

Experimental Study on Light Weight Block of Papercrete

Ankur Kr.Gupta¹, Prof. Hirendra Pratap Singh², Harshita Lahare

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- ankurgupta276@gmail.com
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>hirendra.rajput2000@gmail.com</u>
 ³ ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – harshitalahare25@gmail.com

Abstract: The construction industry has been known as one of the largest consumers of nonrenewable resources. On the other hand, more waste paper ends up in landfill or dump sites than those recycled. Due to high consumption of natural resourses, such as gravel, sand, clay and wood attributed to the building construction industry, coupled with the need for affordable housing and environmentally sustainable building materials has led to studies on the possibilities of producing alternative building materials from wastes. However, papercrete being a recently developed material, there are no written mixing and sampling standards available, therefore trial and error method along with data from available literature have been taken to arrive at the desired results. The main experimentation will involve, the moulding of the proposed lightweight blocks to be tested in accordance with relevant standards.

An Investigation Into The Role Of Site And Soil Characteristics In On-Site Sewage Treatment

Abhishek Singh Baghel¹, Abhishek Dubey², Alok Dubey³

 ¹ M.Tech (CTM) Student, Civil Engg. ,SORT (PEOPLE'S UNIVERSITY) Email id- <u>abhisheksinqhbaqhel1993@gmail.com</u>
 ² M.TECH (CTM) Student, Civil Engg. ,SORT (PEOPLE'S UNIVERSITY) Email id- <u>acd2807@gmail.com</u>
 ³ M.TECH (CTM) Student, Civil Engg., SORT (PEOPLE'S UNIVERSITY) Email id-<u>alokdubey05@gmail.com</u>

Abstract: The on-site treatment of sewage is common in all rural and regional areas of the world. Due to the public health and environmental risks that these treatment systems pose, the need for adopting performance based management strategies is gaining increasing recognition. This demands the establishment of performance objectives for on-site sewage treatment and disposal which are based on stringent scientific analysis. A research project was undertaken to identify and investigate the role of influential site and soil characteristics in the treatment performance of subsurface effluent disposal areas. The treatment performances of a number of septic systems on a range of site and soil conditions were investigated together with detailed soil analysis. The changes to soil physico-chemical characteristics of the disposal area due to effluent application and its effluent renovation capacity were found to be directly related to the subsurface drainage characteristics. Significant changes to exchangeable cations and chemical parameters such as ph, electrical conductivity and cation exchange capacity (cec) can result due to subsurface effluent application. A relationship exists between chemical parameters such as exchangeable na and ca: mg ratio and cec. A strong correlation also exists between the depth to the restrictive subsurface horizon and observed treatment performance. The study confirmed that soil chemistry can be a valuable predictive tool for evaluating the long-term performance of sewage effluent disposal systems particularly in poorly drained sites.

Risk Management in Construction Projects

Ajay Chaurasia¹. Prof. Govind Singh Solanki². Prof. Harsita Lahare ³

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- lk.rahulsingh@gmail.com
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>govindmudp@gmail.com</u>
 ³ ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>harshitalahare25@gmail.com</u>

Abstract: The paper provides a preliminary research to the basics of risk analysis and its implementation in construction industry. Risk and Uncertainty, are terms frequently used and therefore have been explained in detail. Different Risks on Construction project have been considered and the various methods of Analysis that are adopted are discussed. General Internal and External Sources of risk in Construction Projects have been dealt with.

Use of Cranes In Construction Technology

Ajay Kumar Shukla¹, Rakesh Sakale ²,Kapil Sharma³

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- <u>ajayshukla11121989@gmail.com</u>
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>rakesh_sakale@reddif.com</u>
 ³ ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>kapsha05@gmai.com</u>

Abstract :In construction of HRB and Big Project we required a huge amount of capital investment and men power although we have the entire thing with us we are unable to complete project on time because there are no. of factor affecting the delay in construction. The main reason behind this might be improper management and illiteracy about the modern equipments. So by using modern equipments we can achieve the targeted goal within time and can optimize the time period required to complete the project based on survey made , it is concluded that 50% of contractor can achieve they target within time with the help of modern equipment. It is also found that few of them have completed the work before time. In which crane is considered to be important part of construction industries they play important role in vertical circulation of material and transportation.

The efficiency of crane depends upon the type of crane used. There are no's of crane with different boom and jib and different working methods. Tower crane is one of the best options to use in India. As environment condition and studied a single zip tower crane is used. As without the help of the staircase we can transport the material. This reduces the frequency of accidents and provides safety to labors.

Result Analysis of Production of Concrete Based On Aggregates by Applying Statistical Quality Control Tools

Rahul Singh¹. Prof. Rakesh Sakale². Prof. R.C. Patil³

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- lk.rahulsingh@gmail.com
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id –<u>rakesh_sakale@reddif.com</u>
 ³ ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>rcpmecivil@gmail.com</u>

Abstract: It is the purpose of this paper to obtain estimates of variability associated with the production of portland cement concrete. Application of statistical quality control techniques to building construction materials has gathered considerable momentum over the past few years. Proper process identification and management are becoming more relevant and critical challenges for quality professionals, process engineers and business leaders. World class organizations use total quality management tools to identify, analyze and assess gualitative and guantitative data that are relevant to their processes with the main objective towards the continuous improvement of the process and the delivery of high quality products and services. One of the simplest and most effective tools used by engineers in manufacturing and service processes for problem solving and quality improvement, are the basic quality tools known as the magnificent seven. These seven basic quality tools stated clearly that 95% of quality related problems in any organization can be resolved using these tools and hence many opportunities for improving processes can be generated; this important statement has been proven in the field by different organizations and researchers including the construction industry worldwide. In this paper it is proposed to collect the data of quality control program necessitates the gathering of vast amount. Furthermore, it is almost implicit that these data are unbiased and a religious adherence to random selection of samples is usually necessary to insure this lack of bias. To accomplish this, a specially designed sampling plan using random number tables is proposed to develope for statistical parameters.

Floating Columns: A Critical Approach Intended For Different Locations

Deepak Kumar Bandewar¹ Gourav Sachdeva², Ankit Sachdeva²

 ¹ Asst. Prof. Department Of Civil Engg.,SORT,(People's University) Bhopal Email id – <u>deepakmt04@gmail.com</u>
 ² Prof. Department Of Civil Engg.,RCOEM, Nagpur Email id- <u>gouravsachdeva16@gmail.com</u>
 ² M. Tech. Scholar, Department Of Applied Mechanics VNIT, Nagpur Email id- <u>ankit0508sachdeva@gmail.com</u>

Abstract: A comparative analytical approach is considered to find out the behavior of a building frame along with the considerations of seismic effects. Numbers of models are considered, each model is again classified into various sub-models with different positions of floating columns. In this paper, the equations are obtained for Maximum Displacements (in X & Z direction) along with Minimum Reactions (in Y direction) for up to six-storied SMRF (Special moment resisting frame) Building. IS 1893 (Part-1) is used in this work. The above building is modeled in stiffness based software STAAD-Pro. V8i. & the concluding remarks are given.

Analysis Of Microsilica Concrete In Laboratory Rane Prashant Tikaram¹, Dinesh Wankhede², Vivek Singh³

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- <u>raneprashant200@gmail.com</u>
 ² M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- <u>dineshwankhede301@gmail.com</u>
 ³ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id-<u>viveksingh15@gmail.com</u>

Abstract: Infrastructure development for a country is a principle development and concrete plays a vital role. Concrete is the world's largest consuming material in the field of construction. From time immemorial research over concrete has been going on to enhance its performance and strength. Now-a-days the replacement of cement through some admixtures or other additives to increase the strength is in trend. Micro silica, a very fine non-crystalline material is very good as filler material to provide good strength. Here in the experiment an attempt has been made to increase the strength of concrete by replacing cement with 0%,5%,10%,15% and 20% of micro silica in a design mix of m35 and m40.the materials are taken from the locally available sources in the north eastern region. The compressive strengths are checked for the mentioned design mixes. It is found that an optimum replacement of 15% of micro silica to that of cement (by weight) increases the strength of concrete to 30%.further addition of micro silica shows a decreasing trend.

A Study on Impact of Concrete Construction on Environment

Dheeraj Kumar Panday¹, Govind Singh Solanki², Dipali Tiwari3

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- <u>dheerajce091018@yahoo.com</u>
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>govindmudp@gmail.com</u>
 ³ ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – deepalitiwari50@gmail.com

Abstract: In this paper, a case study on environmental impacts concrete products and concrete construction was performed, and appropriate evaluation of the effect of concrete construction on environmental impact reduction was discussed. Since construction is considered as one of the main sources of environment pollution in the world, the level of knowledge and awareness of project participants with regards to environmental impacts of construction processes needs to be enhanced. This paper aims to assess the most common environmental impacts due to the construction process in India. To achieve this aim, a deep study on the concrete construction in India is performed. It was found that 'Concrete production', 'Transportation Resource', 'Noise Pollution', and 'Dust Generation with Construction Machinery' are the greatest environmental impacts in India respectively. The results of this study are useful for construction sites to become aware of construction processes impacts on the environment.

Environmental Performance of Construction Operations and Its Management Framework

Sangeet Sahare¹, Jiji M Thomas², Govind Singh Solanki³

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG.SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- <u>sangeetsahare @gmail.com</u>
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG., SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>govindmudp @gmail.com</u>
 ³ ASST. PROF. DEPARTMENT OF CIVIL ENGG., SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>jijimthomas020@gmail.com</u>

ABSTRACT: As summarized in the previous chapter, construction activities account for a significant amount of environmental impact. Environmental performance is therefore one of the key objectives of construction projects, along with cost, time, quality, and safety. However, the environmental aspects of construction projects are not adequately considered in current practice during the stages of a construction project—contracting, planning, and construction. Nor are we yet fully aware of what is required to reduce the environmental impact of construction operations at each stage. In this context, this chapter describes key factors that determine the environmental performance of construction operations and strategies to improve each determinant. By integrating those strategies, the framework for the environmental performance management is presented at the end.

Increase in Strength of Concrete by Using Bottle Caps

Roopesh Vishwakarma¹, Satish Kumar Kushwah², Kapil Sharma³

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG.SORT (PEOPLE'S UNIVERSITY) Email id- <u>roopesh.vish@gmail.com</u>
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG., SORT (PEOPLE'S UNIVERSITY) Email id – <u>satish.kushwah1@gmail.com</u>
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG., SORT (PEOPLE'S UNIVERSITY) Email id – <u>kapsha05@gmail.com</u>

Abstract: Advances in technology enhance human comforts and in the same time damages the environment. Metals used as cap for containers preserve liquids in the bottles very well, but the disposal of caps particularly soft drink bottle caps is a headache to environmental engineers. On the other hand concrete, the most popular construction material, second highest consumed material after food is very strong in compression. It has some limited properties, low tensile strength, low ductility, low energy absorption, and shrinkage, cracking associated with hardening and curing. Out of all these drawbacks low tensile strength is the important one and to counteract this problem some fiber like material can be added to concrete to increase its tensile strength. Hence an attempt has been made in the present investigations to study the influence of addition of waste materials like soft drink bottle caps from workshop at a dosage of 0.25%, 0.5% and 1.0%, of total weight of concrete as fibers. In this investigation caps were cut into strips of size of 3mm width and 10mm length. Experimental investigation was carried out adding bottle caps in concrete and tests were carried out as per recommended procedures by relevant codes. The experimental values such as compressive strength, split tensile strength and flexural strength were found to be increased. The experimental results revealed that increase in compressive strength is not prominent up to 1.0 % addition bottle cap fiber. Split tensile and flexural strength of 1.0 % bottle cap fiber concrete increase up to 12.59% and 16.96 % more than plain concrete(without bottle cap fiber) respectively. The experimental results of flexural strength and split tensile strength are compared with different codal values. The results revealed that ACI-1985approximately predicts the split tensile strength while Foster and ACI-1995 overestimates these values.

Comparative Study of Bricks Made With Alternative Materials to Clay Brick

Rashtra Bandhu¹ Aman Khare² Prof. Govind Singh Solanki³

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG.SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- <u>rashtrabandhu1@gmail.com</u>
 ² M.TECH (CTM) STUDENT, CIVIL ENGG.SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>amankahre14@gmail.com</u>
 ³ASST. PROF. DEPARTMENT OF CIVIL ENGG., SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>govindmudp@gmail.com</u>

Abstract: This thesis presents data from a laboratory study on the different bricks which is made by using different materials (Fly Ash, Cement and Lime) with their variable percentages in it. The requirement of locally manufactured building materials using waste and alternate material has been emphasized in many countries of the world. There is imbalance between the expensive conventional building materials and traditional building materials. To address this situation, attention has been focused on less costly alternative building materials with higher desired properties. Bricks are masonry units composed of inorganic non-metallic material and are widely used as building components all over the world. The bricks could be (unburnt) sun-dried or burnt. Burnt bricks are usually stronger than sun dried bricks, especially if they are made of clay or clayey material. There are different categories of the bricks, depending upon the admixtures and raw material used for making bricks. It is also common that certain admixtures are added to burnt brick raw mixes to produce different effects in the finished product. A second category of admixtures includes organic matter such as Fly ash, Cement, Lime etc. those are also can be used for manufacturing the bricks

Relationship between Non-Destructive Testing of Rebound Hammer and Destructive Testing

Samunder Singh Rajput¹ Prof. Satish Kumar Kushwah² Prof. Rakesh Sakale³

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- sunnyrj@gmail.com
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – satish.kushawah1@gmail.com
 ³ ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id –rakesh_sakale@reddif.com

Abstract: This paper deals with Experimental investigation for M-20& M25 grade of concrete having mix proportion 1:2.09:3.02 &1: 1.98:3.88 with water cement ratio 0.45 & 0.42 to study the destructive strength, grade of concrete, & rebound number. A result data obtained has been analyzed and compared with destructive results. A relationship between rebound numbers vs. destructive strength represented mathematically and graphically. Result data clearly shows that increase the strength of concrete in 28 days rebound number and destructive strength for M-20 & M25Grade of Concrete.

Perforamance Analysis of Expansive Soil Treated With Stone Dust and Fly Ash

Yaspal Rajput¹, Hirendra Pratap Singh², Akshay Trivedi³

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- <u>yashpalrajpoot@gmail.com</u>
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>hirendra_rajput2000@yahoo.com³</u>
 ³ ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>omansayyed01@gmail.com</u>

Abstract: Nearly 51.8 million hectares of land area in india are covered with expansive soil .the property of these expansive soils, in general, is that they are very hard when in dry state, but they lose all of their strength when in wet state. In light of this property of expansive soils, these soils pose problems worldwide that serve as challenge to overcome for the geotechnical engineers. One of the most important aspects for construction purposes is soil stabilization, which is used widely in foundation and road pavement constructions; this is because such a stabilization regime improves engineering properties of the soil, such as volume stability, strength and durability. In this process, removal or replacing of the problematic soil is done; replacement is done by a better quality material, or the soil is treated with an additive.

in the present study, using fly ash obtained from heg plant mandideep(nearly 6000 tonnes) and from vardman mandideep company(nealy 6500 tonnes), stabilization of black cotton soil obtained from bhopal is attempted. With various proportions of this additive i.e. 10%, 20%, 30%, 40% & 50%, expansive soils is stabilized. Owing to the fact that fly ash possess no plastic property, plasticity index (p.i.) of clay-fly ash mixes show a decrease in value with increasing fly ash content. In conclusion, addition of fly ash results in decrease in plasticity of the expansive soil, and increase in workability by changing its grain size and colloidal reaction. Tested under both soaked and un-soaked conditions, the cbr values of clay with fly ash mixes were observed. Analysis of the formerly found result exposes the potential of fly ash as an additive that could be used for improving the engineering properties of expansive.

Chemical Admixtures Used In Concrete Mix Design to Improve the Quality of Concrete and For the Maintenance of Concrete

Shanu Agrawal¹ Ravikant Singh² Shivendra Nath Mishra³

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG.SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- <u>shanu.agrawal93@gmail.com</u>
 ² M.TECH (CTM) STUDENT, CIVIL ENGG. Email id – <u>ravikant14@gmail.com</u>
 ³ M.TECH (CTM) STUDENT, CIVIL ENGG. Email id – shivendramishra05@gmail.com

Abstract: Chemical admixtures are the ingredients in concrete other than portland cement, water, and aggregate that re added to the mix immediately before or during mixing to improve the quality and durability of concrete. These admixtures also used for the maintenance purpose of concrete. The admixture should be employed only after an appropriate evaluation of its effect on performance of concrete under the condition in which the concrete intended to be used. The benefits in the uses of water reducers not limited to this. When water reduces shrinkage and porosity of concrete are reduces which provides the durability to concrete structures. There is a wide range of High Range Water reducing admixtures for concrete which used to improve the quality and strength of concrete. The chemical named Dr. Fixit Pidicrete CF 21 and Dr. Fixit Pidicrete CF 111-S used as high range water reducing admixtures for concrete.

Solid Waste Used As Construction Material

Chaudhari Bhushan Arun¹, Govind Singh Solanki²

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- bhushan.ch18@gmail.com
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>govindmudp@gmail.com</u>

Abstract:There is increase in population in very large amount due to this the disposal of solid waste is a major problem. The main objective of this study is to investigate the potential use of various solid wastes for producing construction materials (such as bricks). The present paper is based on the innovative work in solid wastes in which various admixtures are used such as fly ash & glass fibers to increase brick strength. This paper also shows the results which are taken by the test on bricks.

Effect of Sloping Ground on Structural Performance of RCC Building under Seismic Load

Sitaram Vishwakarma¹, Dipali Tiwari^{2,} Jiji M Thomas²

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- sitvish@gmail.com
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id –deepalitiwari50@gmail.com
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – jijimthomas020@gmail.com

ABSTRACT: Previous studies emphasize for proper planning and construction practices of multistoried buildings on sloping ground in particular, which lead to irregularities in plan and elevation of the buildings. The storey displacement and the base shear action induced in columns have been studied with respect to different sloping angles. However, in normal design practice the designers generally ignore the effect of sloping ground on the structural behavior of the building.

The present work investigates the structural behavior of reinforced concrete beams, columns and footing in sloping ground. The seismic analysis of a G+4 storey RCC building on varying slope angles i.e., 7.50 and 150 is studied and compared with the same on the flat ground. The seismic forces are considered as per IS: 1893-2002. The structural analysis software STAAD Pro v8i is used to study the effect of sloping ground on building performance during earthquake. Seismic analysis has been done using Linear Static method. The analysis is carried out to evaluate the effect of sloping ground on structural forces and displacement. The horizontal and vertical reaction in footings, axial force and bending moment in columns, shear force and bending moment in beams, storey drift and lateral displacement are critically analyzed to quantify the effects of various sloping ground. It has been observed that the footing columns of shorter height attract more forces, because of a considerable increase in their stiffness, which in turn increases the shear force and bending moment significantly. Thus, the section of these columns should be designed for modified forces due to the effect of sloping ground. The present study emphasizes the need for proper designing of structure resting on sloping ground.

Seismic Behavior of Buildings Having Horizontal

Irregularities

Sujeet Lowanshi^{1,} Hirendra Pratap Singh ,² Deepak Bandewar³

 ¹ M.Tech (CTM) Student, Civil Engg. ,Sort (People's University) Bhopal Email Id- <u>sujeet86@gmail.com</u>
 ² Asst. Prof. Department Of Civil Engg.,Sort (People's University) Bhopal

Email Id – <u>hirendra.rajput2000@gmail.com</u> ² Asst. Prof. Department Of Civil Engg.,Sort (People's University) Bhopal Email Id – <u>deepak bandewar@gmail.com</u>

Abstract

During an earthquake, failure of structure starts at points of weakness. This weakness arises due to discontinuity in mass, stiffness and geometry of structure. The structures having this discontinuity are termed as Irregular structures. Irregular structures contribute a large portion of urban infrastructure. The object of the present work is to compare the seismic behavior of regular building with horizontally irregular buildings. For this purpose four multi-storey buildings are considered and provided with and without shear walls. Building 1 is regular plan, building 2 is of L shape, building 3 is of T shape and building 3 is of C shape in plan. To study the behavior the response parameters selected are lateral displacement and storey drift. All the buildings are assumed to be located in zone II, zone III, zone IV and zone V. For analysis STAAD.Pro software is used.

Techno Economical Geopolymer Concrete Using Fly Ash to Replace Cement

Susheel Tiwari¹, R.C. Patil², Narendra Patel ³

 ¹ M.Tech (CTM) Student, Civil Engg. , SORT(People's University) Bhopal Email Id- Susheeltiwari0303@Gmail.Com
 ² Asst. Prof. Department Of Civil Engg., SORT (People's University) Bhopal Email Id – <u>Rcpmecivil@Gmail.Com</u> ³ M.Tech (CTM) Student, Civil Email Id – <u>Narendrapatel0@Gmail.Com</u>

Abstract:Demand for concrete as construction material is on the increase so as the production of cement The geopolymer concrete is a strong substitute for replacing ordinary Portland cement based concrete composites in construction. Therefore the present study represents the results of an investigation on strength characteristics of geopolymer concrete prepared by using fly ash as source material and NaOH + Na2SiO3 (both in solution form) as alkali activator.

Development of Bricks from Waste Material: A Review Paper

Chaoudhari Tejas Prakash¹ Prof. Govind Singh Solanki², Patil Bhushan Subhersing

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- tejas <u>tpchaudhari91@gmail.com</u>
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id – <u>govindmudp@gmail.com</u>
 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL Email id- <u>patilbhushan2000@GMAIL.COM</u>

Abstract: Since the large demand has been placed on building material industry especially in the last decade owing to the increasing population which causes a chronic shortage of building materials, the civil engineers have been challenged to convert waste to useful building and construction material. Recycling of such waste as raw material alternatives may contribute in the exhaustion of the natural resources.the conservation of not renewable resources. improvement of the population health and security preoccupation with environmental matters and reduction in waste disposal costs. In the review of utilization of those waste, this paper reviewed recycling various waste material in bricks production. The effects of those wastes on the bricks properties as physical, mechanical properties will be reviewed and recommendations for future research as out comings of this review will be given. This reviewed approach on bricks making from waste is useful to provide potential and sustainable solution.

Analysis of Critical Success Factors For Construction Project

Vivek Patel¹ Prof. Kapil Sharma Prof. Dilip Sahu³

 ¹ M.TECH (CTM) STUDENT, CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL EMAIL ID- <u>VIVEKRAJJ123@GMAIL.COM</u>
 ² ASST. PROF. DEPARTMENT OF CIVIL ENGG.,SORT (PEOPLE'S UNIVERSITY) BHOPAL EMAIL ID – <u>KAPSHA05@GMAIL.COM</u>
 ³ M.TECH (CTM) STUDENT,CIVIL ENGG. ,SORT (PEOPLE'S UNIVERSITY) BHOPAL EMAIL ID – <u>DILIPSAHU02@GMAIL.COM</u>

Abstract: As construction is dynamic in nature due to the increasing uncertainties in technology, budgets, and development processes and hence it a risky business and the possibility of business failure always exists, companies have to consider the parameters that can have a direct effect to their success in business. In this study, the critical factors leading to construction company success will be investigated. Nowadays, building projects are becoming much more complex and difficult. The project team is facing unprecedented changes. The study of project success and the critical success factors (CSFs) are considered to be a means to improve the effectiveness of project.

A construction project is completed as a result of a combination of many events and interactions, planned or unplanned, over the life of a facility, with changing participants and processes in a constantly changing environment. Certain factors are more critical to project success than others. These factors are called critical success factors (CSFs). The term "critical success factors," in the context of projects and the management of projects is defined as those factors predicting success on projects.

Achieving success is a highly critical issue for the companies to survive in a competitive business environment. The construction industry is also an area where there is strong competition due to a large number of construction contractors. There have been many factors such as qualified employees, quality workmanship and financial management that can lead to company success in the construction industry. The aim of this study was to investigate the critical factors leading to construction company success.

An Efficient Approach of Stenography in Multimedia Files

Dr.Anshuman Sharma¹, Arpit Sharma², Amit Dwievdi³, Shivam Akasodiya⁴

¹Associate Professor and Head, Department of Computer Science,SORT,PU,Bhopal,India, <u>Email-anshuman515@gmail.com</u>
²Research Scholar, Department of Computer Science,SORT,PU,Bhopal,India, Email-<u>as18031958@gmail.com</u>
³Research Scholar, Department of Computer Science,SORT,PU,Bhopal,India Email-<u>amitdwivedigwl97@gmail.com</u>
⁴Research Scholar, Department of Computer Science,SORT,PU,Bhopal,India Email-<u>amitdwivedigwl97@gmail.com</u>

Abstract: Data hiding is a method of hiding secret messages into a cover-media such that an unintended observer will not be aware of the existence of the hidden messages. We propose new information hiding technique in text, audio, image and video data without embedding any information into the target content by using neural network trained on frequency domain. Proposed method can detect a hidden bit codes from the content by processing the selected feature sub blocks into the trained neural network. Hidden codes are retrieved from the neural network only with the proper extraction key provided. The extraction key, in proposed method, are the coordinates of the selected feature sub blocks and the network weights generated by supervised learning of neural network. The supervised learning uses the coefficients of the selected feature sub blocks as set of input values and the hidden bit patterns are used as teacher signal values of neural network. With our proposed method, we are able to introduce an information hiding scheme with no damage to the target content.

Efficiency Prediction of Solar Air Heater with the Using Of Difference Size of Ribs by Computational Fluid Dynamics

Saurabh Maharana², Avinash Patidar², Vimal Mishra²

1 M. Tech Student, Department of Mechanical Engineering, PCRT, Bhopal (MP),emailsaurabhjee2009@gmail.com

2 Associate Professor, Department of Mechanical Engineering, PCRT, Bhopal (MP), emailavinashpatidar19@gmail.com

Abstract: This paper presents the study of heat transfer in a rectangular duct of a solar air heater having Different size of square rib roughness on the absorber plate by using Computational Fluid Dynamics (CFD).The effect on the surface heat transfer and velocity were investigated. In this Solar air heater an absorber plate is made of 'Aluminium' and Roughened with difference size ribs due which creates the turbulence in the flow of fluid (air) and increases the heat transfer from the absorber plate to the fluid. The commercial finite-volume based CFD code ANSYS FLUENT 16.0 is used to simulate turbulent airflow through artificially roughened solar air heater The computations based on the finite volume method with the SIMPLE algorithm have been conducted for the air flow in terms of Reynolds numbers ranging from 3000-18000. CFD simulation results were found to be in good agreement with experimental results and with the standard theoretical approaches. It has been found that the temperature & velocity is increasing at the outlet side and also turbulence is increasing due to the different rectangular ribs shape of the duct.

Salient Features of Non- Conventional Energy Resources

V. Khade & S. Choudhary

AISECT UNIVERSITY Department of Physics

Abstract: Energy has become an important and one of the basic in fracture of economic development of a country. Renewable energy resources like sun, wind, earth, geothermal are environmental friendly and sustainable source of energy. These resources are known non- conventional energy resources. Present paper gives focus on consumption importance and environmental aspect of renewable energy. In the study , present state scenario in the field of non- conventional resources are focused.

Dependency of Cosmic Ray Modulations on Heliospheric Processes

A.Ghosh¹, S.Choudhary²

1 Laxmi Narayan College of Technology ,Bhopal 2 AISECT UNIVERSITY Department of Physics ,Bhopal

Abstract: Galactic cosmic rays (GCRs) are isotropic in the heliosphere. As they interact with the solar wind, interplanetary magnetic field, GCRs suffer changes in spectrum and intensity on their voyage through the solar system,. The most prominent heliospheric process are the Sunspots. The GCR intensity anti-correlates with the number of sunspots on the Sun-having a higher intensity when there are few sunspots and vice-versa when there are more sunspots. Cosmogenic nuclei deposited in tree rings and ice cores are used as a reference to measure solar activity of last thousand years and this anticorrelation between GCR intensity and sunspot number has proved as the basis for using that analysis. In addition to the well-known 11-year cosmic-ray cycle, another prominent heliospheric process is the polarity of the solar magnetic field to which a 22-year variation is related. These variations can be understood using the physics of charged-particle motion in turbulent electric and magnetic fields associated with the solar wind plasma. During the Maunder Minimum when sunspots were scarce, polarity reversals of solar magnetic field occurred, and the guantity of GCRs enhanced in the 11-year cycle such that a stronger magnetic field yielded smaller GCR flux. Present study shows variations in cosmic ray modulations with solar magnetic field and sunspot number during the time span of 2011-2016.

Green Technology for the Environment

Hemlata Raikwar

(Research Scholar), Department of Chemistry Govt. M.L.B. Autonomous College Bhopal (M.P.)

Abstract: In recent years ,an increasing concern of environmental issues in particular global warming environmental safety is making its mark on the population of the world specifically the world's industry technology and manufacturing process of a product play a major role in imputing the environmental either positive or negative depending on the processthe effect of humans and technology on our natural environment have become a topic of much research in many areas of science, technology, and industry. Gols of Green technologyare waste reduction, material management, population prevention, the environment benefits are obvious a healthier and less polluted environmental practically all production -oriented industries could benefit-from the application of Green technology.this includes operation within the step any system life cycle including raw material producers, manufacters, product users and waste handlers. The general the most intensive and wasteful industries are those at the early stages of the production cycle 75% of all manufacturing waste in 1990 was generated by chemical, petroleum, paper and primary metals industries theemergence of Green technology was not concerned with environmental impact of their products.as regulation become more demanding and public more aware the incentive for green technology becomes more apparent.

Luminescence Studies of Zinc Selenoid Nanoparticles Embedded in PVA Matrix

Kamal K. Kushwah¹, S.K. Tiwary¹, M.Ramrakhiani²

¹ Department of Applied Physics, Jabalpur Engineering College, Jabalpur, M.P., India. ²Department of Post Graduate Studies and Research in Physics and Electronics, Rani Durgavati Vishwavidhyalaya, Jabalpur, M.P., India *<u>Corresponding author</u>: kamal_kushwah2005@yahoo.com

Abstract: The nanocomposite films of ZnSe nanocrystals in polyvinyl alcohol (PVA) matrix were synthesized by environmental friendly chemical method. Optically transparent ZnSe/PVA composite Samples of comparatively larger thickness were prepared and obtained in film form. All prepared films exhibit excellent optical transparency in the visible region. The Refractive index of these composites was measured at sodium line with the help of Abee's refractometer and was found in the range of 1.695-1.730. It is seen that refractive index varies with polymer concentration.

These composites were characterized by X-ray diffraction which indicates the nanocrystalline cubic structure of ZnSe in polymer matrix with particle size up to a few nm. The Particle size is found to decrease by increasing PVA Concentration and zinc selenide content. The photoluminescence properties of these composite films with varying concentration of PVA and zinc selenide content have been investigated.

The PL peak of ZnSe was observed at 465 nm. The higher intensity is observed by increasing PVA content in nanocomposite films without any change in position of PL peak. The PL emission may be attributed to surface states. Due to better passivation of surface states by increasing PVA concentration, non-radiative transitions are reduced which enhance the PL intensity. It is also observed that, with increasing ZnSe content in nanocomposites, PL peak shifts towards shorter wavelength. The blue shift could be attributed to quantum size effect in ZnSe nanoparticles in PVA matrix with increasing ZnSe content.

The composites with PL peak in blue region may be useful for their potential application in anti-reflection coating, optical display devices and optical sensors.

Luminescence studies on Polymer Nanocomposites Layers (CdSe/PVA & ZnSe/PVA)

Kamal K. Kushwah^{1, 2}, S.K. Tiwary¹, M.Ramrakhiani²

¹ Department of Applied Physics, Jabalpur Engineering College, Jabalpur, M.P., India. ²Department of Post Graduate Studies and Research in Physics and Electronics, Rani Durgavati Vishwavidhyalaya, Jabalpur, M.P., India <u>*Corresponding author</u>: kamal_kushwah2005@yahoo.com

Abstract: The nanocomposite films of CdSe and ZnSe nanocrystals in polyvinyl alcohol (PVA) matrix were synthesized by environmental friendly chemical method. These composites were characterized by X-ray diffraction which indicates the nanocrystalline structure of CdSe and ZnSe in polymer matrix with particle size up to a few nm. The Particle size is found to decrease by increasing PVA Concentration and metal selenide (ZnSe/CdSe) content. The photoluminescence properties of these composite films with varying concentration of PVA and metal selenide (ZnSe/CdSe) content have been investigated.

The PL peak of CdSe and ZnSe were observed at 510 nm and 465 nm respectively. The higher intensity is observed by increasing PVA content in CdSe and ZnSe nanocomposite films without any change in position of PL peak. It is also revealed that, In ZnSe & CdSe/PVA nanocomposites with varying ZnSe/CdSe content, PL peak shifts towards shorter wavelength as particle size is reduced.
Designing of MCM using Truncation Logic Multiplication

Kaushiki Sharma¹

¹M-Tech Research Scholar, Department of Electronics & Communication Engineering, IES, Bhopal

Abstract: Multiplying by known constants is typical operation in numerous advanced signal preparing (DSP) algorithms. Elite DSP system is executed in custom hardware, in which the designer has the ability to choose which logic elements will be used to perform the computation. By exploiting the properties of binary multiplication, it is conceivable to acknowledge steady multiplication with less rationale assets than required by a generic multiplier. This work proposed an architecture which is more efficient in terms of area as well as delay than the existing system. The critical path analysis has been done using architecture optimization of the system utilizing booth multiplier. The proposed design significantly improves the delay up to 3.483ns which is 26.06% less than existing system.

Low latency requests superior hardware, and little physical size to farthest point propagation delays. VLSI executions are the main accessible means for meeting these two necessities, however productive calculations are additionally significant. An augmentation to Booth's calculation for duplication (excess Booth) has been created, which speaks to incomplete items in an in part repetitive frame. This repetitive representation can decrease or dispose of the time required to deliver "hard" (products that require a convey propagate addition) required by the customary higher request Booth calculations. This augmentation diminishes the zone and power prerequisites of completely parallel executions, but on the other hand is as quick as any increase technique yet announced.

Review on Nanoelectronic Devices

Pramod Kumar¹, Pankaj Dubey², Izhar Mohd Khan³

(PhD Scholar)

Abstract: A review on research developments toward nanometer scale is being provided by this paper for use in making ultra densely integrated electronic computers. Here special attention to two classes of alternative to field effect transistors will be given. Two different classes which are considered in this review are: quantum effect single electron solid state devices. and molecular electronic devices. Literature about different types of nanoelectronic devices is surveyed in this review. This information is presented in non-mathematical form.

Effect of a polyherbal formulation of two herbs viz. *Tridex* procumbens (L.) and Bryophyllum pinnatum (L.) to promote Hypoglycemia

Savita Dixit², Smita Nair^{2*}, N. Ganesh¹

 ¹ Jawaharlal Nehru Cancer Hospital and Research Centre, Bhopal, Madhya Pradesh, India-462032
² Maulana Azad National Institute of Technology, Bhopal, Madhya Pradesh, India-462003 *smita28cofg@gmail.com

Abstract: The present work is a preliminary study of a polyherbal formulation of two herbs viz. *Tridex procumbens (Tp)* and *Bryophyllum pinnatum (Bp)* and an assessment of its antidiabetic activity. The formulation was screened for its phytochemical constituents, total phenols and flavonoids. It was also analyzed for its inhibitory effect against the digestive enzyme α -amylase and to compare their individual hypoglycemic potential with their combination (Bt) in a specific proportion using the standard drug Acarbose. The study reports for the first time the synergistic effect of the extracts in the inhibition of alpha amylase activity. It can be concluded that the hydroalcoholic plant extracts interacted synergistically exhibiting lowering of fasting blood glucose (FBG) and the presence of phytochemicals like flavonoids, saponins, and tannins may have contributed greatly to the hypoglycemic property of the extracts.

Impact of Japanese Collaboration& Management Practices on Indian Manufacturing System

Shailendra Sharma

Email Id: skrs46@gmail.com

Abstract:From Centuries people of India have cultural relations with Japanese people because spread of Buddhism via China and Korea

India is largest recipient of ODA i,e Official Development Assistance which is expected to reach U.S \$50 Billion by2019-20.

India & Japan were enemies in world war II but political relations were warm and cordial since India's independence

Prime Minister NobusukeKishi's visit to India in 1957 opened the door for Japanese loan in Yen Since 1986 Japan became India's largest Aid-Donor

Japanese organisations have technical and Financial collaboration in India .Former Prime Minister's visit to Japan culminated into signing an Joint statement towards Japan –India strategic and Global partnership .

Many Japanese auto makers in two wheelers and four wheelers have established their firm footings namely –

Maruti Suzuki India Limited

Honda Car India Ltd

Honda Motor Cycle and Scooter India Ltd (H.M.S.I)

Hero Honda now Hero Motocorp

Toyota Kirloskar Motor Limited (T.K.M)

I had the opportunity of joining MarutiUdyog limited in 1983 and our first batch of Managers and Engineers went to Japan in April 83. We went to A.O.T.S KenshuCentre ,OSAKA and stayed there for 6 weeks . we learned Japanese language and got first hand exposure to Japanese culture.

We had our training and learning with respect to Automobile manufacturing systems at Suzuki Kosai plant in Hamamatsu

We came back in August 83 and started working in our respective Departments and I personally have gained very enriching & knowledgeable experience in various facets of Automobile Manufacturing systems.

During same time Hindustan motors and Premier Automobile limited were producing Passenger cars in our country volume of production was not very high. Cars were considered as Luxury hence governed by Licencing Policy .Marutyudyog because of Japanese collaborations has ventured in conveyor System of production and their total support has not only impacted the environment of company ,it has developed the positive attitude towards System and procedure resulting thereby a new Quality driven work culture

"Green Building" Leader in Energy & Environment Design for Building Sector

Shubham Jain¹, Kapil Sharma²

¹Student of Diploma Civil Engg. Department Sort (People's University) Email Id –Sjshubhamjain76@Gmail.Com ²Asst. Prof.Department Of Civil Engg. Sort (People's University) Email Id – <u>Kapsha05@Gmail.Com</u>

Abstract: Technology gives us a comfortable and luxurious lifestyle and makes our day today works easy. Every one is talking about new technology of different sectors. IT i.e. Information technology, third & fourth generation data transfer & communication, power sector, real estate & infra structure development are basic technological sector of this generation. Here we are mainly discussing Power Sector & Environment. Global warming and present environmental phenomenon is major concern of whole world. Energy demand of whole world including INDIA increases each coming day. For meeting that energy demands each country got indulge expanding their power production. The growth of energy sector is higher than population growth in developing countries likes INDIA CHINA, which can be emphasized from the increasing trend of per capita energy consumption. We know that, energy generation from the fossil fuels directly affectes the environment and increasing trends of energy generation from fossil fuels also have its bad impact on environmental conditions. The best option to meet the energy demand and supply requirements i.e. to equalize the demand of energy and its supply is to "GO GREEN" Here is a some concept is presented in this paper to save environment & energy consumption. "GREEN BUILDING CONCEPT". This concept can be a major step for the building sector for eco- friendly design energy & evironmental concerns. Before emphasizing more on this Topic we would like to define a word "Sustainabi lity"

"Meeting the Needs of People Today without Destroying the Resources that is (resources) need of once day today life. Based on the long Range Planning & the recognition of the finite nature of natural resources."

Review Paper on Reversible BCD Adder Subtractor using Reversible Gate

Aravind S¹, Awadhesh K G Kandu²

 ¹P.G Scholar, Department of Electronics & Comm., SORT, Bhopal, India <u>Aravindsnair939@gmail.com</u>¹
² Associate Professor, Department of Electronics &Comm., SORT Bhopal, India <u>awadeshkandu@gmail.com</u>²

Abstract: Programmable reversible logic is emerging as a prospective logic design style for implementation in modern nanotechnology and quantum computing with minimal impact on circuit heat generation. Recent advances in reversible logic using and quantum computer algorithms allow for improved computer architecture and arithmetic logic unit designs. Arithmetic unit design using reversible logic gate has received much attention as it reduces power dissipation with no loss of information. This paper proposes the design of 32-bit Binary Coded Decimal (BCD) addition and subtraction unit using reversible logic gates. The reversible 32 -bit BCD addition unit is designed using the following modules such as reversible 4-bit Carry Propagate unit using reversible logic gates such as Feynman gate and URG gate and a reversible 4-bit error correction unit. The 4-bit error correcting unit designed by reversible (4x1) Multiplexer (MUX) unit using Toffoli gate and TNOR gates to provide the output with a precise value. The reversible 32-bit BCD addition. The proposed design issynthesized using Xilinx ISE software and simulated using VHDL test bench.

Security Issue of Vehicular Adhoc Network

Ankit Temurnikar¹, Kalyani Sahu²

M.tech (CSE) ankit.temurnikar@gmail.com, kalyanisahu786@gmail.com

Abstract: The road to a successful introduction of vehicular communications has to pass through the analysis of potential security threats and the design of robust security architecture able to cope with these threats. Ad hoc networks are a new wireless networking paradigm for mobile hosts. In this paper, we designed a framework of intelligent transport system. The main task of the road condition information transferring module is deal with the information exchange of the car inside, car to car and car to road. Vehicular networks are likely to become the most relevant form of mobile ad hoc networks. In the ITS of this paper, we concern the security issues of VANETs from some aspects and provide the appropriate solving measures. To make sure the ITS can be used under the security

Energy Management System in HEV Using PI Controller

Krtika Prakash¹, Vishwanath Tiwari²

^{1[·]} LAXMI NARAYAN COLLEGE OF TECHNOLOGY, RGPV,Bhopal,kritikaprakash629@yahoo.com 2. SCHOOL OF RESEARCH AND TECHNOLOGY,PU,Bhopal,tiwari.vishwanath@rediffmail.com

Abstract: These days the utilization of Hybrid Electric Vehicles (HEV) is expanding significantly. The HEV is for the most part reliant on power and there is dependably a requirement for capacity of charge. Power module (FC), Batteries and Ultra Capacitor are being utilized for the proposed HEV as an electric power source or as a vitality stockpiling unit. The point of building up a vitality administration method is to use the sources as indicated by the prerequisite of the vehicle with help of controller. This builds the proficiency of crossover electric vehicle to decrease the fuel utilization and undesirable discharge. The Maximum Power Point Tracking (MPPT) in FC is done utilizing (Perturb and Observe) calculation. In this paper, the control of vehicles at variable speed is accomplished adequately.

A Common Fixed point theorem for sub compatibility mappings satisfying contraction of Integral type in Menger spaces

Naval singh¹, Dilip Kumar Gupta^{2,*}, Dinesh Tiwari³

- 1 Department of Mathematics, Govt. Science & Commerce College, Benazeer Bhopal (M.P.) India
- 2 Department of Mathematics, People's College of Research & Technology Bhopal (M.P.) India
- 3 Department of Mathematics, People's College of Research & Technology Bhopal (M.P.) India *Corresponding author E Mail <u>dilipkmaths@gmail.com</u>

Abstract: In this paper we establish Common fixed point theorem for four mappings in Menger spaces satisfying the variable coefficient contraction of integral type under the notion of sub compatibility and sub sequentially continuity. Our main result improves and extends several known results.

Estimation of Wind Load on a Double Arch Type Greenhouse and Evaluation of Its Structural Stability Using Finite Element Method

Ajit Kumar Nayak

Scientist, ICAR-CIAE, Bhopal-462038

Abstract: Purpose-Greenhouse is a successful example of protected cultivation technologies particularly in the context of climate change and adverse weather conditions. The greenhouse structures in India are generally designed as saw-tooth type with its members made up of GI pipes. However, the structural design guidelines thathave been adopted from other countries do not consider the variation of wind speed across India. As a consequence, the inappropriate and unscientifically designed structures either leadto collapse in short span of time or those are overdesigned. This has been a major hindrance in augmenting the coverage under greenhouse which is presently 70,000 ha in India.Therefore, a double arch type greenhouse was engineered considering local wind speed to cater the need of the farmers and greenhouse manufacturing industry that can withstand all the loads without yielding.

Methods:An existing greenhouse structure (saw tooth type) of 560m²area was analysed as 3D steel frame and modelled in ANSYS 15.0 using boundary conditions for its structural stability. All the loads acting on the greenhouse such as dead load, live load and wind load were estimated using IS code 875 (part 3) and IS 14462: 1997. BEAM-188 and COMBIN-7 elements of Finite Element code of ANSYS 15.0 were selected for frame and rafter respectively.The truss and columns were studied with deflections, failure zones diagrams that lead to safe design of the structure.

Result: The load due to truss, crop, pipe frame and live load were found to be 250 N/m², 200 N/m², 100 N/m² and N/m² respectively whereas the wind load contributed the major chunk of the load as high as 770 N/m². The stress distribution were assessed by the stress contours for the worst possible combination of loads on structural elements like purlin, ridges, trusses, bottom chord, main column, big arch, small arch. Smallarch was yielding significantly whereas the main column, long arch and truss were not found yielding beyond the ultimate yieldstress. The structure was redesigned for a factor of safety of 1.3. Maximum Stress was found to be 130 MPa which is less than the yield stress of 240 MPa and deflection was predicted to 4 mm.

Conclusion:Among all the loads acting on the greenhouse, the wind load found to be more than 50% of the total load of the greenhouse. Therefore, a structure must be designed for a particular region and elsewhere designed structure cannot be transferred per se. The main conclusions that have emerged from the study are:

1. The optimal designed greenhouse can withstand the wind load up to 150 kmph.

- 2. Long arches which are of 60 mm diameter with 2mm thickness can be replaced by 42mm OD of same thickness.
- 3. Short arch should be enhanced to 43mm pipe OD with 2 mm thickness from 33mm.
- 4. Main column of 76 mm diameter with 3.2 mm thickness is enough to transfer the compression load to the foundation.

Couple with this, other elements like trusses, purlin, bottom chord, ridge, connectors, foundations were also optimized.

The Comparison of Rate Of Heat Transfer For Helical Coil Heat Exchanger At Multiple Cross-Section Using CFD

Ajeet Kumar¹, Avinash Patidar², Pawan Kumar Patil³

1 M.TECH Student, Department of Mechanical Engineering, PCRT Bhopal(M.P.), ajeetkr92@gmail.com 2 Associate Professor, People's College of Research and Technology, Bhopal(M.P.) <u>avinashpatidar19@gmail.com</u> 3 M.TECH Student, Department of Mechanical Engineering, SSSCE, Bhopal(M.P.) pawan.asct@gmail.com

Abstract: Enhancing the heat transfer by the use of helical coils has been studied and researched by many researchers, because the fluid dynamics inside the pipes of a helical coil heat exchanger offer certain advantages over the straight tubes, shell and tube type heat exchanger, in terms of better heat transfer and mass transfer coefficients. Various configurations of coil structure are possible, and the configuration in which there is a series of vertically stacked helically coiled tubes is the most common type. This configuration offers a high compact structure and a high overall heat transfer coefficient; hence helical coil heat exchangers are widely used in industrial applications such as power sector, nuclear power generation, food processing plants, heat recovery systems, refrigeration, food industry, industrial HVACs etc. Convective heat transfer between a surface and the surrounding fluid in a heat exchanger has been a major issue and a topic of study in the recent years. In this particular study, an attempt has been made to analyse the effect of Rate of heat transform from a three different cross-sections on the helical tube, where the hot fluid flowing in tube and outer surface of tube having less temperature then hot fluid. Different cross-sections of the pipes are taken into consideration while running the analysis. The contours of pressure, temperature, velocity magnitude and the mass transfer rate from the tubes were calculated and plotted using ANSYS FLUENT 16.0 where the governing equations of mass, momentum and energy transfer were solved simultaneously, using the k-E two equations turbulence model. The fluid flowing through the tube was taken as water.

Biodiesel from Mixture of Tree Based Oils, Its Performance in a Diesel Engine and Environmental Issues

Prakash C. Jena¹ and Hifjur Raheman²

¹ Scientist (SS), ICAR-Central Institute of Agricultural Engineering, Bhopal-462038, MP email – prakiitkgp@gmail.com ² Professor, IIT Kharagpur- 721302, WB

Abstract: Study was aimed to optimize the process parameters to produce biodiesel from mixtures of mahua (Madhuca Indaica) and simarouba (Simarouba Glauca) oil. The performance and emissions characteristics of a 10.3 kW diesel engine was also carried out with mixture of oil biodiesel (MSB), high speed diesel (HSD) and their blends at different engine loadings. The process parameters for biodiesel production were optimized by response surface methodology (RSM) using central composite rotatable design (CCRD). A second-order polynomial model was obtained to predict the acid value of oil after pre-treatment as a function of methanol to oil ratio (M), catalyst concentration (C) and reaction time (T). Based on this method, the quantity of oil to M, C and T were found to be 0.21 v/v, 1.42% v/v and 62.11 min, respectively to reduce the FFA level to less than 1%. The transesterification reaction was carried out with 0.18 v/v of M and 0.54% w/v of KOH. The performance results showed that brake specific fuel consumption (BSFC) and exhaust gas temperature (EGT) increased, whereas Brake thermal efficiency (BTE) decreased with increase in MSB proportion in the blends as compared to HSD alone. However, with increase in engine load, BTE and EGT increased whereas BSFC reduced for MSB, HSD and their blends. The CO and HC emission reduced, whereas CO₂ and NO_x increased with increase in MSB percentage in the blends. Based on performance and emissions, MSB blends up to 10% (MSB10) was found suitable for running the diesel engine.

Engineering and Humanities

Dr. Soumya Shukla

Associate Professor Department of Applied Science &Humanities School of Research and Technology E.mail: <u>shuklasaumya235@rediffmail.com</u>

Abstract: There is a widespread belief that Engineers must have a good amount of exposure with a great many subjects taught traditionally within the humanities This position reflects the claim put forth on many fronts that modern, scientific technology poses many questions of a highly value laden nature that can only be addressed using the methods and insights of the humanities. What can we teach from humanities and introduce into the engineering curriculum without diluting the main Engineering education. The twin challenges for engineering education are engineering programs should have more technology subject added and the engineer should be able to make responsible cultural, political and social decisions that shape the future of the world .Simple way out is if engineering and humanities educators come together with mutual respect to help each other out in larger interest of budding engineers. The relation between engineering program and the humanities much needed, but it needs to occur within an environment that nurtures fundamental discourse between engineers, technologists, scientists and the full range of humanists and social commentators.