

# **Chemical, Civil and Mechanical Engineering Tracks of 3rd Nirma University International Conference on Engineering (NUiCONE2012)**

**Procedia Engineering Volume 51**

**Ahmedabad, India  
6-8 December 2012**

Editors:

**Usha Mehta**

**ISBN: 978-1-62748-633-0  
ISSN: 1877-7058**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© by Elsevier B.V.  
All rights reserved.

Printed by Curran Associates, Inc. (2013)

For permission requests, please contact Elsevier B.V.  
at the address below.

Elsevier B.V.  
Radarweg 29  
Amsterdam 1043 NX  
The Netherlands

Phone: +31 20 485 3911  
Fax: +31 20 485 2457

<http://www.elsevierpublishingsolutions.com/contact.asp>

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

## TABLE OF CONTENTS

<b>A Trigonometric Shear Deformation Theory for Flexure of Thick Beam .....</b>	1
<i>Ajay G. Dahake, Yuvaraj M. Ghugal</i>	
<b>Non-destructive Testing of Concrete Structures in Karad Region .....</b>	8
<i>Rajan L. Wankhade, Amarsinh B. Landage</i>	
<b>Evaluation of PET and PP Geotextile Reinforced Embankment on Soft Soil .....</b>	19
<i>Jigisha M. Vashi, Atul K. Desai, Chandresh H. Solanki</i>	
<b>Utilization of Bagasse Ash as a Partial Replacement of Fine Aggregate in Concrete .....</b>	25
<i>Prashant O. Modani, M. R. Vyawahare</i>	
<b>Analysis of RC Brick Filled Composite Beams using MIF .....</b>	30
<i>Rakesh Patel, S. K. Dubey, K. K. Pathak</i>	
<b>Combine Effect of Rice Husk Ash and Fly Ash on Concrete by 30% Cement Replacement .....</b>	35
<i>Satish H. Sathawane, Vikrant S. Vairagade, Kavita S. Kene</i>	
<b>Semi-Active Control of a Benchmark Building using Neuro-Inverse Dynamics of MR Damper .....</b>	45
<i>Irfan H. Vadtala, Devesh P. Soni, Dolarray. G. Panchal</i>	
<b>Structural Repair and Rehabilitation of 3 no. (G+8) Multi-Storeyed Residential Buildings, at ONGC Colony at Chandkheda, Ahmedabad, Gujarat.....</b>	55
<i>Varinder. K. Singh</i>	
<b>Evaluation and Mix Design for Ternary Blended High Strength Concrete.....</b>	65
<i>R. Rathan Raj, E. B. Perumal Pillai, A. R. Santhakumar</i>	
<b>Closed Form Solution for Deflection of Flexible Composite Bridges .....</b>	75
<i>R. K. Gupta, K. A. Patel, Sandeep Chaudhary, A. K. Nagpal</i>	
<b>Fluid-Structure-Soil Interaction Effects on Seismic Behaviour of Elevated Water Tanks.....</b>	84
<i>Uma Chaduvula, Deepam Patel, N. Gopalakrishnan</i>	
<b>Analysis and Design of Diagrid Structural System for High Rise Steel Buildings .....</b>	92
<i>Khushbu Jani, Paresh V. Patel</i>	
<b>Improving the Performance of Concrete using 3D Fibres.....</b>	101
<i>Alan Richardson, Marcus Heather</i>	
<b>Study of Black Cotton Soil Characteristics with Cement Waste Dust and Lime .....</b>	110
<i>J. B. Oza, P. J. Gundaliya</i>	
<b>Modal Curvature and Modal Flexibility Methods for Honeycomb Damage Identification in Reinforced Concrete Beams.....</b>	119
<i>V. B. Dawari, G. R. Vesmawala</i>	
<b>Effects of Granulated Blast Furnace Slag in the Engineering Behaviour of Stabilized Soft Soil.....</b>	125
<i>Laxmikant Yadu, R. K. Tripathi</i>	
<b>Strength of Normal Concrete Using Metallic and Synthetic Fibers .....</b>	132
<i>Vikrant S. Vairagade, Kavita S. Kene</i>	
<b>Structural Engineering Challenges in Structures for Cooling Water System in Thermal Power Plant .....</b>	141
<i>Dipal P. Trivedi, Raja I. Bagga, Jignesh V. Chokshi</i>	
<b>Effect of Load Height on Buckling Resistance of Steel Beams.....</b>	151
<i>S. G. Morkhade, L. M. Gupta</i>	
<b>Properties of Self Compacting Concrete Using Recycled Coarse Aggregate .....</b>	159
<i>K. C. Panda, P. K. Bal</i>	
<b>Damage Characteristics of Cracked TMT Reinforcement Bars.....</b>	165
<i>B. N. Pandya, B. K. Thakkar, J. D. Rathod</i>	
<b>Effect of Different Patterns and Cracking in FRP Wrapping on Compressive Strength of Confined Concrete .....</b>	169
<i>Kinjal V. Ranolia, B. K. Thakkar, J. D. Rathod</i>	
<b>Analysis of Frame using Applied Element Method (AEM).....</b>	176
<i>Vikas Gohel, Paresh V. Patel, Digesh Joshi</i>	
<b>A Novel Reinforcement Pattern for Exterior Reinforced Concrete Beam-Column Joint .....</b>	184
<i>S. M. Kularni, Y. D. Patil</i>	
<b>Adaptation to the Future Climate: A Low Carbon Building Design Challenge .....</b>	194
<i>Saadie Barbhuiya, Salim Barbhuiya, Hamid Nikraz</i>	
<b>Laboratory Assessment to Correlate Strength Parameter from Physical Properties of Subgrade.....</b>	200
<i>Mukesh A. Patel, H. S. Patel</i>	
<b>Parametric Studies on Compressive Strength of Geopolymer Concrete.....</b>	210
<i>Prakash R. Vora, Urmil V. Dave</i>	

<b>FRP Wrapping for RC Columns with Varying Corner Radii .....</b>	220
<i>Sushil S. Sharma, Urmil V. Dave, Himat Solanki</i>	
<b>Effectiveness of Various Methods of Jacketing for RC Beams .....</b>	230
<i>Sachin S. Raval, Urmil V. Dave</i>	
<b>Behavior of GFRP Wrapped RC Columns of Different Shapes .....</b>	240
<i>Rahul Raval, Urmil Dave</i>	
<b>Optimum Utilization of Fly Ash for Stabilization of Sub-Grade Soil using Genetic Algorithm .....</b>	250
<i>Jyoti S. Trivedi, Sandeep Nair, Chakradhar Iyyunni</i>	
<b>Analysis of CFT, RCC and Steel Building Subjected to Lateral Loading.....</b>	259
<i>Ketan Patel, Sonal Thakkar</i>	
<b>Dynamic Response Control of a Building Model using Bracings .....</b>	266
<i>Dhara Panchal, Sharad Purohit</i>	
<b>Effects of Randomness in Fault Rupture and in Soil and Structural Parameters on R. C. Portal Frame Response in Delhi Region.....</b>	274
<i>K. Satish, Hemant Shrivastava, G. V. Ramana, A. K. Nagpal</i>	
<b>Strengthening of RC Beams Subjected to Combined Torsion and Bending with GFRP Composites .....</b>	282
<i>Vishnu H. Jariwala, Paresh V. Patel, Sharadkumar P. Purohit</i>	
<b>Structural Performance of Degraded (Corroded) Reinforced Members – An Analytical Study .....</b>	290
<i>Himat Solanki, Rushang Dave, Ravi Gehlot</i>	
<b>Adsorption of Phenol from Wastewater in Fluidized Bed Using Coconut Shell Activated Carbon .....</b>	300
<i>Sunil J. Kulkarni, Ravi W. Tapre, Suhas V. Patil, Mukesh B. Sawarkar</i>	
<b>Adsorption of Lead on Gel Combustion Derived Nano ZnO .....</b>	308
<i>V. Venkatesham, G. M. Madhu, S. V. Satyanarayana, H. S. Preetham</i>	
<b>Ionic Liquids: - The Novel Solvent for Removal of Dibenzothiophene from Liquid Fuel .....</b>	314
<i>Swapnil A. Dharaskar, Kailas L. Wasewar, Mahesh. N. Varma, Diwakar. Z. Shende, Chang Kyoo Yoo</i>	
<b>Water to Nanofluids Heat Transfer in Concentric Tube Heat Exchanger: Experimental Study .....</b>	318
<i>Rohit S. Khedkar, Shriram S. Sonawane, Kailas L. Wasewar</i>	
<b>La<sub>1-x</sub>Sr<sub>x</sub>CoO<sub>3</sub> (x=0, 0.2) Perovskites Type Catalyst for Carbon Monoxide Emission Control from Auto-Exhaust .....</b>	324
<i>Femina Patel, Sanjay Patel</i>	
<b>Enhancement of Esterification Reaction by Pervaporation Reactor: An Intensifying Approach .....</b>	330
<i>Ajit P. Rathod, Kailas L. Wasewar, Shriram S. Sonawane</i>	
<b>Decolourization and Mineralization of Reactive Black-5 with Transition Metal Oxide Coated Electrodes by Electrochemical Oxidation.....</b>	335
<i>Bhavna D. Soni, Jayesh P. Ruparelia</i>	
<b>Thermo – Physical Characterization of Paraffin based Fe<sub>3</sub>O<sub>4</sub> Nanofluids .....</b>	342
<i>Rohit S. Khedkar, A. Sai Kiran, Shriram S. Sonawane, Kailas Wasewar, Suresh S. Umre</i>	
<b>Liquid-Liquid Extraction and Spectrophotometric Determination of Vanadium(V) with p-Carboxy-N-Phenyl-Calix[4]resorcinarene-hydroxamic Acid.....</b>	347
<i>Shibu G. Pillai, Ankur H. Dwivedi, Neha Patni</i>	
<b>Wheat as a Promising Substitute of Corn for Bioethanol Production.....</b>	355
<i>Neha Patni, Shibu G. Pillai, Ankur H. Dwivedi</i>	
<b>Synthesis, Characterization and Dyeing Behaviour of Heterocyclic Acid and Mordent Dyes on Wool and Silk Fabrics .....</b>	363
<i>Hitendra M. Patel</i>	
<b>Drying Characteristics of Okra Slices on Drying in Hot Air Dryer .....</b>	371
<i>P. K. Wankhade, R. S. Sapkal, V. S. Sapkal</i>	
<b>Thermal Design of Ammonia Desuperheater-Condenser and Comparative Study with HTRI.....</b>	375
<i>Shreya Sahajpal, Parin D. Shah</i>	
<b>Use of Genetic Algorithm to Model Phase Equilibria of Systems Consisting of 3-Methylthiophene &amp; Hydrocarbons .....</b>	380
<i>A. Kulkarni, M. H. Joshipura</i>	
<b>Generalized PSRK Model for Prediction of Liquid Density of Ionic Liquids.....</b>	386
<i>N. K. Patel, M. H. Joshipura</i>	
<b>A Review on Prediction of Properties of Biodiesel and Blends of Biodiesel.....</b>	395
<i>Parag Saxena, Sayali Jawale, Milind H. Joshipura</i>	
<b>Prediction of Vapor Pressure of Fatty Acid Methyl Esters.....</b>	403
<i>Parag Saxena, Jitesh C. Patel, Milind H. Joshipura</i>	
<b>Single Step Oxidation of Methane to Methanol–Towards Better Understanding .....</b>	409
<i>Priyank Khirsariya, Raju K. Mewada</i>	
<b>Deep Removal of Sulfur from Model Liquid Fuels using 1-Butyl-3-Methylimidazolium Chloride .....</b>	416
<i>Swapnil A. Dharaskar, Kailas L. Wasewar, Mahesh. N. Varma, Diwakar. Z. Shende, Chang Kyoo Yoo</i>	

<b>Challenges in the Production of Hydrogen from Glycerol – A Biodiesel Byproduct Via Steam Reforming Process.....</b>	423
<i>Kartik S. Avasthi, Ravaru Narasimha Reddy, Sanjay Patel</i>	
<b>Electro-catalytic Materials (Electrode Materials) in Electrochemical Wastewater Treatment .....</b>	430
<i>Priya. S. Patel, Nikita Bandre, Ankita Saraf, Jayesh. P. Ruparelia</i>	
<b>Crown Ether Bis-diazo Dyes for Aqueous Inkjet Inks by Micro Emulsion Technique .....</b>	436
<i>Harikrishnan K. Uma, Shobhana K. Menon</i>	
<b>Development of Rate Expression for Glycerol Hydrogenation Reaction .....</b>	443
<i>Bharat N. Chatwani, Raju K. Mevada</i>	
<b>Studies on Degradation of Reactive Red 135 Dye in Wastewater using Ozone .....</b>	451
<i>Sandip Sharma, Jimit Buddhdev, Manish Patel, Jayesh P. Ruparelia</i>	
<b>Intensification of Esterification Reaction of Lactic Acid with Iso-propanol using Pervaporation Reactor .....</b>	456
<i>Ajit P. Rathod, Kailas L. Wasewar, Shiriram S. Sonawane</i>	
<b>Production of Synthesis Gas by Carbon Dioxide Reforming of Methane over Nickel based and Perovskite Catalysts.....</b>	461
<i>Sandeep K. Chawl, Milka George, Femina Patel, Sanjay Patel</i>	
<b>Study on the Catalytic Properties of Silica Supported Copper Catalysts .....</b>	467
<i>Manish Dixit, Manish Mishra, P. A. Joshi, D. O. Shah</i>	
<b>Preparation and Characterization of SnO<sub>2</sub> Thin Film Coating using rf-Plasma Enhanced Reactive Thermal Evaporation .....</b>	473
<i>Punit Patel, Ayyan Karmakar, Chetan Jariwala, Jayesh P. Ruparelia</i>	
<b>Evolving Sustainable Cities through the Fabric of Technological Transformation .....</b>	480
<i>Santosh Kolte, Anurag Kandya, Ketan Lakhtaria, Vishal Patel, Priyanka Ghosh, Pratima Singh, Harsh Morabia</i>	
<b>Ultrasonic-Assisted Extraction of Aloin from Aloe Vera Gel.....</b>	487
<i>Ninad R. Jawade, Abhijeet R. Chavan</i>	
<b>Optimisation of Compressive Strength in Zirconia Nanoclusters of the Bis-GMA &amp; TEGDMA based Dental Composites .....</b>	494
<i>Umesh Vishnu Hambire, Vipin Kumar Tripathi</i>	
<b>Utilization of Biomass based Fuel in a Naturally Aspirated Diesel Engine.....</b>	501
<i>R. Prakash, R. K. Singh, S. Murugan</i>	
<b>Thermal-structural Analysis of Electrical Discharge Machining Process .....</b>	508
<i>Chinmaya P. Mohanty, Jambeswar Sahu, S. S. Mahapatra</i>	
<b>Design and Analysis of Fixture for Welding an Exhaust Impeller .....</b>	514
<i>Jigar D. Suthar, K. M. Patel, Sanjay G. Luhana</i>	
<b>Effect of Different Flow Regime on the Static and Dynamic Performance Parameter of Hydrodynamic Bearing .....</b>	520
<i>Vijay Kumar Dwivedi, Satish Chand, K. N. Pandey</i>	
<b>Modeling of Relative Length and Relative Energy Loss of Free Hydraulic Jump in Horizontal Prismatic Channel .....</b>	529
<i>Sanjeev Kumar Gupta, R. C. Mehta, V. K. Dwivedi</i>	
<b>Nonlinear Analysis of Leaf Springs of Functionally Graded Materials .....</b>	538
<i>Dipendra Kumar Roy, Kashi Nath Saha</i>	
<b>Design of Human Exo-skeleton Suit for Rehabilitation of Hemiplegic People .....</b>	544
<i>Shah Mihir Rajesh</i>	
<b>Multi-objective Optimization of Electrochemical Machining of Hardened Steel Using NSGA II .....</b>	554
<i>Biswesh R. Acharya, Chinmaya P. Mohanty, S. S. Mahapatra</i>	
<b>Physical and Mechanical Properties of Bi-directional Jute Fiber Epoxy Composites .....</b>	561
<i>Vivek Mishra, Sandhyarani Biswas</i>	
<b>Evaluation of FEM based Fracture Mechanics Technique to Estimate Life of an Automotive Forged Steel Crankshaft of a Single Cylinder Diesel Engine .....</b>	567
<i>Rajesh M. Metkar, Vivek K. Sunnapwar, Subhash Deo Hiwase, Vidya Sagar Anki, Mahendra Dumpy</i>	
<b>Development of a Heat Conduction Model and Investigation on Thermal Conductivity Enhancement of AlN/Epoxy Composites .....</b>	573
<i>Alok Agrawal, Alok Satapathy</i>	
<b>Overall Equipment Effectiveness (OEE) Calculation - Automation through Hardware &amp; Software Development.....</b>	579
<i>Ranteshwar Singh, Dhaval B. Shah, Ashish M. Gohil, Milesh H. Shah</i>	
<b>A DEA Approach for Optimization of Multiple Responses in Electrical Discharge Machining of AISI D2 Steel.....</b>	585
<i>Jambeswar Sahu, Chinmaya P. Mohanty, S. S. Mahapatra</i>	

<b>Total Productive Maintenance (TPM) Implementation in a Machine Shop: A Case Study</b>	592
<i>Ranteshwar Singh, Ashish M. Gohil, Dhaval B. Shah, Sanjay Desai</i>	
<b>Performance and Emission Studies of a CI Engine Coupled with Gasifier Running in Dual Fuel Mode</b>	600
<i>Vinay Shrivastava, Abhishek Kumar Jha, Arun Kumar Wamankar, S. Murugan</i>	
<b>Influence of Porosity on the Performance of a Pulse Tube Refrigerator: A CFD Study</b>	609
<i>S. K. Rout, A. K. Gupta, B. K. Choudhury, R. K. Sahoo, S. K. Sarangi</i>	
<b>FEA and Topology Optimization of 1000T Clamp Cylinder for Injection Molding Machine</b>	617
<i>Patel Niral, Mihir Chauhan</i>	
<b>Effect of Pure and Binary Fluids on Closed Loop Pulsating Heat Pipe Thermal Performance</b>	624
<i>Pramod R. Pachghare, Ashish M. Mahalle</i>	
<b>Modelling of Thrust Force during Drilling of Fibre Reinforced Plastic Composites</b>	630
<i>Amrinder Pal Singh, Manu Sharma</i>	
<b>Microcontroller based Sampling and Reagent Arm used for Batch Analyzer</b>	637
<i>Sudha Ramasamy, Rajat Mishra, Padma Thiagarajan</i>	
<b>Numerical Investigation of Flow Induced Vibration for the Triangular Array of Circular Cylinder</b>	644
<i>Hardik R. Gohel, Balkrushna A. Shah, Absar M. Lakdawala</i>	
<b>Thermal Optimization of an Ice Cream Hardening Process</b>	650
<i>Keyur C. Patel, Vikas J. Lakhera, Dilip Sarda</i>	
<b>Stiffness and Thermal Analysis of Doubly Curve Sandwich Panel for an Automobile Application</b>	655
<i>Jatin M. Patel, B. A. Modi</i>	
<b>Effect of Crack on Modal Parameters of a Cantilever Beam Subjected to Vibration</b>	665
<i>D. K. Agarwalla, D. R. Parhi</i>	
<b>Multidimensional Modeling of Direct Injection Diesel Engine with Split Multiple Stage Fuel Injections</b>	670
<i>Subhash Deo Hiwase, S. Moorthy, Hari Prasad, Mahendra Dumpy, Rajesh M. Metkar</i>	
<b>Predicting Temperature in Orthopaedic Drilling using Back Propagation Neural Network</b>	676
<i>Rupesh Kumar Pandey, S. S. Panda</i>	
<b>Experimental Investigations for Start up and Maximum Heat Load of Closed Loop Pulsating Heat Pipe</b>	683
<i>R. K. Sarangi, M. V. Rane</i>	
<b>Liquid Desiccant based Solar Air Conditioning System with Novel Evacuated Tube Collector as Regenerator</b>	688
<i>J. R. Mehta, M. V. Rane</i>	
<b>Computational Study to Assess the Influence of Overlap Ratio on Static Torque Characteristics of a Vertical Axis Wind Turbine</b>	694
<i>Sukanta Roy, Ujjwal K. Saha</i>	
<b>Finite Element Analysis of Double Cracked Beam and its Experimental Validation</b>	703
<i>Irshad A. Khan, Dayal R. Parhi</i>	
<b>3D Parametric Modeling for Product Variants Using Case Study on Inner Ring of Spherical Roller Bearing</b>	709
<i>Ruchik D. Trivedi, Dhaval B. Shah, Kaushik M. Patel</i>	
<b>CFD for Centrifugal Pumps: A Review of the State-of-the-Art</b>	715
<i>S. R. Shah, S. V. Jain, R. N. Patel, V. J. Lakhera</i>	
<b>Cost Analysis of Pump as Turbine for Pico Hydropower Plants – A Case Study</b>	721
<i>K. H. Motwani, S. V. Jain, R. N. Patel</i>	
<b>Kinetic Parameter Estimation of Lignite by Thermo-gravimetric Analysis</b>	727
<i>Vimal R. Patel, Rajesh N. Patel, Vandana J. Rao</i>	
<b>Investigation on the Influence of Multi Walled Carbon Nanotubes on Delamination in Drilling Epoxy/Glass Fabric Polymeric Nanocomposite</b>	735
<i>S. Ponnuswamy, T. V. Moorthy</i>	
<b>Comparative Evaluation on Properties of Hybrid Glass Fiber- Sisal/Jute Reinforced Epoxy Composites</b>	745
<i>M. Ramesh, K. Palanikumar, K. Hemachandra Reddy</i>	
<b>Optimization of Auxiliary Power Consumption of Combined Cycle Power Plant</b>	751
<i>Tejas N. Raval, R. N. Patel</i>	
<b>Influence of Machining Parameters on Delamination in Drilling of GFRP-armour Steel Sandwich Composites</b>	758
<i>M. A. J. Bosco, K. Palanikumar, B. Durga Prasad, A. Velayudham</i>	
<b>CFD Analysis of Spatial Distribution of Various Parameters in Downdraft Gasifier</b>	764
<i>Kieran D. Patel, N. K. Shah, R. N. Patel</i>	
<b>Crack Detection in Cantilever Beam by Frequency based Method</b>	770
<i>Kaushal H. Barad, D. S. Sharma, Vishal Vyas</i>	

<b>Static Analysis of Electrostatically Actuated Micro Cantilever Beam .....</b>	776
<i>Anchit J. Kaneria, D. S. Sharma, R. R. Trivedi</i>	
<b>Investigation on the Turning Parameters for Surface Roughness using Taguchi Analysis.....</b>	781
<i>T. Rajasekaran, K. Palanikumar, S. Arunachalam</i>	
<b>Comparative Study of Rectangular and Trapezoidal Microchannels Using Water and Liquid Metal .....</b>	791
<i>Deewakar Sharma, Parbar Pratham Singh, Harry Garg</i>	
<b>Numerical Optimization of Guide Vanes and Reducer in Pump Running in Turbine Mode .....</b>	797
<i>V. A. Patel, S. V. Jain, K. H. Motwani, R. N. Patel</i>	
<b>Determination of Optimum Inventory Model for Minimizing Total Inventory Cost .....</b>	803
<i>S. M. Samak-Kulkarni, N. R. Rajhans</i>	
<b>Effect of Number and Size of Recess on the Performance of Hybrid (Hydrostatic/Hydrodynamic) Journal Bearing .....</b>	810
<i>Vijay Kumar Dwivedi, Satish Chand, K. N. Pandey</i>	
<b>Experimental Investigations to Study Tool Wear During Turning of Alumina Reinforced Aluminium Composite.....</b>	818
<i>Puneet Bansal, Lokesh Upadhyay</i>	
<b>Determination of Time Delay and Rate of Temperature Change during Tyre Curing (Vulcanizing) Cycle .....</b>	828
<i>Mukund Pandya, R. N. Patel, S. K. P. Amarnath</i>	
<b>Author Index</b>	