

Lecture Notes in Civil Engineering

Arjun Sil

Denise-Penelope N. Kontoni

Rathish Kumar Pancharathi *Editors*

Recent Trends in Civil Engineering

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 Springer

Lecture Notes in Civil Engineering

Volume 274

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ISSN 2366-2557

ISSN 2366-2565 (electronic)

Lecture Notes in Civil Engineering

ISBN 978-981-19-4054-5

ISBN 978-981-19-4055-2 (eBook)

<https://doi.org/10.1007/978-981-19-4055-2>

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Preface

The First International Conference on Recent Advancements in Civil Engineering (ICRACE) 2021 was held at the National Institute of Technology Silchar, Assam, India, during the period 17–19 September 2021. ICRACE aims to bring together experts from academic, scientific, and industrial communities to address new challenges and present their latest research findings, ideas, developments, and perspective of the future directions in the field of civil engineering. The conference serves to foster for presenting novel and fundamental advances in the fields of civil engineering. The main aim of online ICRACE 2021 is to cover a wide range of critical topics concerning the use of recent advances in civil engineering. This includes all fields of civil engineering such as construction, geotechnical, structural, earthquake, environmental, water resources, transportation, and architectural engineering. ICRACE intended to follow up the scientific studies and experiences gained in the developments of the innovative and sustainable construction materials and their applications in the field of concrete infrastructures and transportation engineering during the last decade.

The ICRACE conference 2021 included ten keynote/invited speakers of repute from different backgrounds of the civil engineering community. It involved five parallel sessions with main themes of the conference being primarily focused on (i) Structural Engineering—including Theory and Advanced Technology of Engineering Structure, High-rise Structure and Large-span Structure, Bridge and Tunnel Engineering, New Structure and Special Structure, Advanced Concrete Technology, Civil Engineering Materials, Durable Structures, Sustainable Design in Built Environment, Structural and Construction Engineering, and Sustainable Construction Technologies; (ii) Structural Dynamics and Earthquake Engineering—including Engineering Structure Safety and Disaster Prevention, Building Energy Conservation and Green Architecture, Structural Liability, Durability and Health Monitoring, Coastal Engineering, Performance-based Design, Disaster Management, Structural Model Validation, Fluid–Structure Interaction, and Smart-Structures and Materials; (iii) Geotechnical Engineering—including MEMS/NEMS, Sensors, Actuators, Nanogenerator, Energy Harvester, Micromachining, Microfluidics, Lab-on-Chip, Healthcare Systems, Embedded System Design, Biomedical Systems, IoT and Smart Systems, Robotics and Mechatronics, MEMS Packaging, Reliability,

Semiconductor Memories; (iv) Water Resource Engineering—including Hydraulic and Hydro-Power Engineering, Engineering Water Management, New Technology, Method and Technique in WRE, Hydraulic Engineering, Reservoir Planning and Management, Integrated Water Management, Floods and Droughts Management, Environmental Impact Assessment, Hydraulic Structures, Groundwater Hydraulics, Computational Fluid Dynamics, Ocean Engineering, Numerical Analysis in Water Resources Engineering, and Soft Computing Techniques and Applications in Water Resources; and (v) Transportation Engineering—including Road and Bridge Engineering, Surveying Computing in Civil Engineering, Traffic Guidance and Forecast, Urban Traffic Control and Congestion Pricing, Vehicle Safety and Emissions, Highway Pavements, Railroad and Railway Engineering, Civil and Urban Engineering, Sustainable Transportation Infrastructures, Traffic Operations and Intelligent Transportation Systems, Transportation Safety, Transportation Network Analysis, Pavement Analysis and Design, Use of Recycled and Waste Materials in Pavement Construction, Pavements Mix Design, Pavement Material Characterization, Bituminous and Alternative Materials, Pavement Performance Modelling, and Sustainability in Pavement Engineering.

However, we are thankful to Prof. Sivaji Bandyopadhyay, Director, NIT Silchar, and Dr. Parthajit Roy (former Head, Civil Engineering Department, NIT Silchar), for their encouragement in various steps of the event. We are thankful to the following keynote speakers: Prof. Hemanta Hazarika (Kyushu University, Japan); Prof. B Bhattacharjee Emeritus (IIT Delhi); Prof. Ganeshan N. Emeritus, NIT Calicut, India; Prof. Mohd Rosli bin Hainin, Universiti Malaysia Pahang, Malaysia; Prof. Krishna R. Reddy, University of Illinois at Chicago, USA; Prof. Rajib Kumar Bhattacharjya, IIT Guwahati, India; Prof. Hadi, Muhammad N. S, University of Wollongong Australia; Prof. Elgawady, Mohamed A., Missouri University of Science & Technology, USA; Dr. Denise-Penelope N. Kontoni, University of the Peloponnese, Greece; and Prof. P. Rathish Kumar, NIT Warangal, India. We wish to convey thanks to our colleagues Prof. S Choudhury, Prof. A. I. Laskar, Prof. A K Dey, Prof. P Choudhury, Prof. A K Barbhuiya, Prof. M Ali Ahamed, Prof. D Chakraborty, Prof. U Kumar, Dr. T Rahman, Dr. P Sultana, Dr. N Borthakur, Dr. N Debnath, Dr. B. K. Roy, Dr. P Das, Dr. S Dutta, Dr. M. L. V. Prasad Raju, Dr. B S Sil, Dr. D Bhowmick, Dr. M Hussain, Dr. D K Ghose, Dr. Nitsh A., Dr. Prashanth J, Dr. S Ghosh, Dr. A K Das, Dr. S Jena, Dr. A Kuity, Dr. O Baro, Dr. A Sahu, and Dr. Kulkarni V. V. Such a big event could not have been possible without the help of our students or research scholars' force. We wish to mention the names of research scholars, some of which we especially remember w.r.t the event as Mr. P N Bhowmik, Mr. Naveen Kumar Vanapalli, Ms. Durga Mibang, Mr. Sudipta Debroy, Mr. J Das, Mr. S P Mishra, Mr. S Biswas, and others. We are thankful to Springer Publications for their consent in publishing a SCOPUS indexed proceedings of the selected papers of ICRACE 2021. Springer has not only added extra flavour to the conference, but also encouraged contributors of papers. We are thankful to Prof. Dr. Denise-Penelope N. Kontoni, University of the Peloponnese, Greece, and Prof. P. Rathish Kumar, NIT Warangal, India, for their

editorial works and guidance. And last but not least, our special thanks go to all energetic faculty coordinators Dr. M L V Prasad, Dr. B S Sil, Dr. K L Singh, and Dr. M Hussain for their tireless effort throughout this event.

We thank all the authors for their contribution to the ICRAACE conference 2021 that has resulted in the proceedings. ICRAACE follows its tradition in selecting and reviewing these papers with great rigour, and we hope that the proceedings will provide a glimpse of the state-of-the-art practices followed in different fields related to civil engineering and its allied branches. We would also like to express our sincerest appreciation to the reviewers of the papers and to various technical and financial sponsors for making this event a grand success.

Silchar, India
Patras, Greece
Warangal, India

Arjun Sil
Denise-Penelope N. Kontoni
Rathish Kumar Pancharathi

Contents

Structural Engineering

Ductile Detailing Practices Using Confined Masonry—A Case Study of Himachal Pradesh	3
Ankur Thakur and M. Abdul Akbar	
Prediction of Twist and Torque of RC Beams of M60 Core Concrete Jacketed with Ferrocement “U” Wraps at Ultimate Stage: Different Methods	17
G. C. Behera and M. L. V. Prasad	
Social Network Theory in Construction Industry: A Scientometric Review	29
Vijayeta Malla, K. V. Prasad, and R. Venkatesan	
Interference Effect Between Tall Buildings with Square Cross-Sections	43
Varun Aneja and Neelam Rani	
Investigation of Crushed Concrete Aggregates as a Replacement for Natural Aggregates in AAB Concrete	55
Sriman Pankaj Boindala, Kruthi Kiran Ramagiri, and Arkamitra Kar	
Identification and Analysis of Material Management Issues in Construction Industry Using ICT Tools	65
Vipul Agarwal	
P-M-M Interaction of Bridges Having Different Construction Materials: CC, SCC and FRSCC	77
Nilanjan Tarafder and M. L. V. Prasad Raju	
An Experimental Study on Flexural Strength of Corroded-Reinforced Concrete Beam with Fly Ash	87
Sandeep Sathe, Sudhir Patil, and Vikram Shete	

UHPC Steel Composite Girder: Numerical Studies on Flexural Behaviour in Negative Moment Region	97
Soorya M. Nair, P. Parthiban, and M. J. Anju	
Parametric Studies and Optimization of Grid Shell Structures Using Genetic Algorithm	109
S. Gokul Santhosh, A. P. Singh, and M. Abdul Akbar	
Study of Moment Curvature Response of Beam as Per IS456 Code and Hognestad's Stress–Strain Curve	123
Pavan Pohekar and Archana Tanawade	
Effect of Silica Sand on the Mechanical and Durability Characteristics of Concrete	139
Kushal Ghosh, Subhashis Bose, Bikram Paul, and Partha Ghosh	
Impact of Optimum Waste Content and NaOH Molarity Dosage on Self-Compacting Geopolymer Concrete Efficiency	147
Endow Ayar Mazumder and L. V. Prasad M.	
Study and Analysis of Irregularities in RC Buildings	157
Praful Patel, Tejas Pathak, and Shardul Joshi	
Enhancement of Mechanical Properties of Cement Mortar Using Ground Granulated Blast Furnace Slag as a Partial Replacement	171
Geethu Elsa Thomas, P. V. Indira, and A. S. Sajith	
Structural Dynamics and Earthquake Engineering	
Seismic Hazard Assessment of Chennai City Using Deterministic Approach	183
R. Kiruthika, V. Vasugi, and V. Jagen	
Stability Analysis of Lift Shaft Tower with Guys for Wind Load	193
Shreekiran and K. S. Babu Narayan	
Comparative Analysis of Diagrid Structural System with Conventional Systems for Tall Buildings	203
Bellamkonda Sai Teja, V. Vasugi, and V. Jagen	
Performance Evaluation of RC Framed Hill Buildings with and Without Shear Walls	217
Zaid Mohammad, Abdul Baqi, and Mohammed Arif	
Structural Behaviour of RC Silo under Gravity and Infill Loads	231
Zaid Mohammad, Saad Shamim Ansari, Mohd. Anwar, and Abdul Baqi	
Experimental and Numerical Study on the Behaviour of Grouted Sleeve Coupler Joint Used in Precast Member Connection	241
S. Paramathmeeka and M. Rajeswari	

Comparative Study of Carbon Fiber-Reinforced Polymer Cabled Structure Subjected to Seismic Loads 263
 Vaibhav Patel and Hanumant Magarpatil

Structural Audit and Assessment of Application of External Post Tensioning Method on Bridge Girder 279
 Rushikesh Hiralal Bicchal and H. R. Magarpatil

Analysis of I-Section Composite Beam with Winding Wire and Metal Strap for Development of Effective Bond 291
 Anand Kumar, Shailja Bawa, and M. Abdul Akbar

Comparison of Response on Building Due to Wind Load as Per Wind Codes [IS 875—(Part 3)—2015] and [AS/NZ1170.2-2011] 307
 Pradeep K. Goyal and Naveen Suthar

Strengthening Measures for Reinforced Concrete Column Against Blast Loading—A Review 319
 Atul Pandey and Hari Krishan Sharma

Variation of Progressive Collapse Resistance of Diagrid Structures Based on Plan Geometry and Section 331
 Nipun B. Harigopal and Mini Remanan

Influence of Side Ratio on Wind Induced Responses of U Plan Shape Tall Building 345
 Shanku Mandal, Sujit Kumar Dalui, and Soumya Bhattacharjya

Comparative Study of Time History Analysis of Outrigger and Tube-In-Tube Structures Using ETABS 357
 Makam Jeevan Kumar and S. M. Gupta

Evaluation of the Behavior of Gusset Plates in Concentrically Braced Steel Frames Under Cyclic Loading 371
 Mehdi Ebadi-Jamkhaneh, Denise-Penelope N. Kontoni, and Masoud Ahmadi

Modeling of Soil-Structure Interaction in Liquefiable Soils Using an Equivalent Linear Approach Including Shear Modulus Updating 389
 Mohammad Iman Khodakarami, Marzieh Dehghan, and Denise-Penelope N. Kontoni

Geotechnical Engineering

Ground-Granulated Blast Furnace Slag-Based Geopolymer-Treated Fibrous Peat 409
 Suhail Ahmad Khanday, Monowar Hussain, and Amit Kumar Das

Finite Element Modelling of RC Silo subjected to Thermal Loads	419
Zaid Mohammad, Mohd. Anwar, Saad Shamim Ansari, and Abdul Baqi	
Utilization of GGBS-Based Geopolymer Lateritic Soils for Sustainable Pavements	429
T. V. Nagaraju, B. M. Sunil, and M. Venkata Rao	
Parametrical Study on the Seismic Performance of Post-installed Anchors Using Injectable Epoxy Mortars	441
Ali Kheyroddin, Hamed Arshadi, Mehran Gudarzi, and Mahdi Kioumars	
Stability Analysis of Non-homogeneous Slopes and Assessment of Failure Characteristics Using HYRCAN	455
G. Sreelakshmi, K. Lini Dev, N. Nithesh, and H. S. Harshan	
Effect of Distance on Bearing Capacity of Strip Footing on Slope	467
Baishali Nandi, Debjit Bhowmik, and Monowar Hussain	
Evaluation of Engineering Properties of Laterite Blocks for Construction Purposes from Selected Zones of Coastal Karnataka Region—A Case Study	477
Bhagyashree, H. N. Udayashankara, and Purushotham G. Sarvade	
A Study on Aquaculture Waste Leachate Transport Through Soil	485
T. V. Nagaraju, B. M. Sunil, and Babloo Chaudhary	
Performance Analysis of Different Geosynthetic Reinforcements in Unpaved Roads of Soft Subgrade	493
Gautam, Sudeep Biswas, Monowar Hussain, and Debjit Bhowmik	
The June 2018 Karinchola Landslide, Kerala State, South India	507
Nirmala Vasudevan, Kaushik Ramanathan, and Anunandh Gopakumar	
Prediction of Seismic Wave Velocity Using Artificial Intelligence	515
Abir Sarkar and Debjit Bhowmik	
Evaluation of Stability of Embankment Dams	541
V. Divya, M. Balaji, N. Chandan Gowda, C. Chandana, and G. M. Jamuna	
Oxidative Degradation of Rhodamine B Dye in Wastewater Using Microwave-Assisted Fentons Reaction	549
Indrashis Saha and Richa Pandey	
Water Resource Engineering and GIS Remote Sensing	
Estimating the Impact of Urbanization on Nitrogen Dioxide Emission Over New Delhi Region Using Satellite Imaginary Model—Pre and During COVID Era	565
C. Ramprasad, M. K. Deekshitha, R. Gayathri, and M. Preethika	

Detection of Oil Spills Using Sentinel-1 Data 575
 Koushik Das, P. Janardhan, and H. Narayana

Analysing the Changing Variations of Indian Ocean Dipole (IOD)—Indian Summer Monsoon Rainfall (ISMR) Relationship Across Northeast India 585
 Partha Pratim Sarkar, Prashanth Janardhan, and Parthajit Roy

Structural Audit of Mutha River Bridge Using Institutionally Developed Displacement Sensors 599
 Husain Anandwala and Hanamant Magarpatil

An Environmental Impact Assessment on Geomorphic Erosion Risk Analysis Using GIS at Jeevna Site, Jeypore, Koraput District, Odisha 615
 Tanmoy Chatterjee, Surajit Munshi, and Duryadhan Behera

Stability Analysis of Gravity Dam Using Finite Element Method and Particle Swarm Optimization 633
 Mrunalini A. Deshmukh and Rajendra B. Magar

Hydrodynamic Analysis of a Fixed Offshore Wind Tower Using ANSYS Aqwa 649
 Neethu Ann Paul and Anitha Joseph

Study on Variability of Influent Characteristics Concentrations of CETP 675
 Shanthi P. Selvam and V. M. Topkar

Modeling Glacio-Hydrologic Processes of Beas Within a Distributed, Water and Energy Balance-Based Hydrology Model 685
 Tanmoyee Bhattacharya, Deepak Khare, and Manohar Arora

Effect of Seasonal Changes on Water Quality of River Mutha 707
 Chinmay Deore, Rohini More, and Sameer Shastri

Effect of Shear Connectors in the Deformability of Circular Plated Joints in Single Layered Lattice Structure 717
 Sajith and Raghavan Ramalingam

One-Dimensional Steady Flow Hydraulic Model for Flood Inundation Mapping 731
 Rupam Gayan and Parthajit Roy

Limitation of Inter-Storey Drift Ratio in Seismic Design of Lead Rubber Bearing Isolated R. C. Building 743
 Rajkumar Manisana and Sunil Sing Mayengbam

Transportation Engineering

Laboratory Study on the Long-Term Mechanical Performance of Cold Mix Asphalt with Rice Husk Ash Filler	757
Pinki Deb and Kh. Lakshman Singh	
Utilization of Bamboo Fibre in the Application of Stone Matrix Asphalt	767
Soumyadeep Deb and Kh. Lakshman Singh	
Effect of Pocket Size of Bamboo Geocell Filled with Sand and Recycled Asphalt Pavement Over Soft Clay Bed	779
T. Uma Shankar, Sudeep Biswas, and Monowar Hussain	
Finite Element Analysis of Flexible Pavement with Non-linear Material Behaviour	789
Nabarun Dey, Barnali Debnath, and Partha Pratim Sarkar	
Risk Management in Public Private Partnerships (PPP)—An Indian Case Study	797
K. V. Prasad, Raja Sekhar Mamillapalli, and Hanumantha Rao Pusarla	
A Comparison of Macroscopic Traffic Stream Models Under Non-lane-Based Heterogenous Highway Traffic	805
Sandeep Singh, Rajesh Kumar Panda, Anisha Biswal, and S. Moses Santhakumar	
Integrated Sensor-Based Approach for Traffic Congestion Prediction Using Probe Vehicle	821
Varun Singh, Anurag Upadhyay, and Asit Kumar	
Structural and Economic Characteristics of Buildings with Different Fire Ratings as Per Indian Codes	835
Ankit Karan, Neelam Rani, and M. Abdul Akbar	
Paratransit Utility and Mode Choice Modelling: A Review	847
Waikhom Victory and Mokaddes Ali Ahmed	
A Damage Detection Technique Using Bridge Influence Surfaces for Structural Health Monitoring of Bridges	865
K. Lakshmi and Prathamesh Apte	