

Annual Conference of the Canadian Society for Civil Engineering 2011

**Ottawa, Ontario, Canada
14-17 June 2011**

Volume 1 of 4

ISBN: 978-1-61839-218-3

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© (2011) by the Canadian Society for Civil Engineering
All rights reserved.

Printed by Curran Associates, Inc. (2011)

For permission requests, please contact the Canadian Society for Civil Engineering
at the address below.

Canadian Society for Civil Engineering
4920 de Maisonneuve Blvd. W. Suite 201
Montréal, QC
H3Z 1N1

Phone: (514) 933-2634
Fax: (514) 933-3504

info@csce.ca

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
Web: www.proceedings.com

TABLE OF CONTENTS

Volume 1

2011 ANNUAL GENERAL CONFERENCE

Flexure of a Layered Composite CFRP Plate under Symmetric and Asymmetric Localized Loading	1
<i>H. Nikopour, A. P. S. Selvadurai</i>	
Hydraulic Pulse Testing of Granite	8
<i>M. Najari, A. P. S. Selvadurai</i>	
Use of Impact-Echo on Detecting Voids in Grouted Prestressed Cable Ducts in Post-tensioned Bridge Decks	16
<i>H. Khederzade, R. Grieve, K. Sennah</i>	
Robert Surtees, C.E.: Fleet Street Pumping Station and Other Civil Works	27
<i>Mark Surtees</i>	
Sensitivity Analysis of the Parameters Affecting Horizontal Travel Distance of Rock Fragments in a Rockfall Using Artificial Neural Networks	39
<i>Houshin Nejati, Attila M. Zsaki</i>	
Massively Parallel Computing in Geomechanics Using GPUs for Application in Probabilistic Simulation	49
<i>Attila M. Zsaki</i>	
Minimum Thickness Requirements Needed to Satisfy Deflection Limits for One-Way Reinforced Concrete Construction	57
<i>Peter H. Bischoff, Stuart Veysey</i>	
Inspection des Tabliers de Ponts Autoroutiers par Méthodes RADAR : Corrélation entre les Méthodes de Traitements Qualitatives et Normalisées	67
<i>F. Saint-Pierre, G. Houde, M.-A. Carrier, A. Philibert</i>	
Evidential Reasoning Using the Fuzzy Extension of Dempster-Shafer Theory: Application to the Quality Assessment of Drinking Water	78
<i>F. Aminravan, M. Hoorfar, R. Sadiq, M. J. Rodriguez, A. Francisque, H. Najjaran</i>	
Welding of Light Gauge Infill Panels for Steel Plate Shear Walls	87
<i>D. A. Neilson, G. Y. Grondin, R. G. Driver</i>	
Removal of Caffeine from Water by Natural Materials	97
<i>S. Sanford, K. Singh</i>	
New Analytical Method and Experimental Verification of Timber Rivet Connections Loaded Parallel-to-Grain	107
<i>P. Zarnani, P. Quenneville</i>	
Practical Analysis for Dynamic Soil-Structure Interaction	119
<i>Y. C. Han</i>	
Innovative Rehabilitation: New Life for a 100-Year-old Steel Truss Bridge	130
<i>K. Lima, S. Kanji, J. Dibattista</i>	
The Use of Digital Imaging Techniques for Mapping Geomaterial Heterogeneity	140
<i>B. Hekimi, A. P. S. Selvadurai</i>	
Axial Flow Hydraulic Pulse Testing of the Argillaceous Lindsay Limestone	147
<i>A. Letendre, A. P. S. Selvadurai</i>	
Settlement Estimation of Shallow Footings in Saturated and Unsaturated Sands Using Cone Penetration Test (CPT) Results	156
<i>Fathi M. O. Mohamed, Sai K. Vanapalli, Murat Saatcioglu</i>	
Growing Historical Pattern for Improved Group Assignment and AADT Estimation Accuracy of Short-term Traffic Counts	166
<i>Ehsan Bagheri, Ming Zhong, James Christie</i>	
Radial Flow Hydraulic Pulse Testing of an Argillaceous Limestone	175
<i>L. Jenner, A. P. S. Selvadurai</i>	
Double Angle Shear Connections with Flare Bevel Fillet Welds	185
<i>Yanglin Gong</i>	
Influence of Composite Traffic Control Mechanisms on Four-Arm Highway Intersection	195
<i>J. Ben-Edigbe, A. Abdelgalil, I. Fallah, A. Minhans</i>	
Integrated Asset Management of Roads, Water Mains and Sewers	204
<i>Tushith Islam, Osama Moselhi</i>	
Optimum Design of Prestressed Concrete Flat Slab Systems under Gravity Loads	213
<i>M. El Semelawy, A. Nassef, A. A. El Damatty</i>	
Edmonton's Legacy of Wastewater Treatment	221
<i>Sid Lodewyk, Hongliang Wang, Lilianna Malesevic, Ross Bulat</i>	
Biosurfactant-enhanced Removal of Petroleum Hydrocarbons in a Soil Bioremediation System	231
<i>B. Y. Zhang, G. H. Huang, L. Liu</i>	
Stormwater Treatment in Edmonton	241
<i>Sid Lodewyk, Lilianna Malesevic, Ross Bulat, Mike Christensen, John Faithful</i>	
Treatment of Acrylic Acid Production Wastewater Using an Anaerobic Membrane Bioreactor	251
<i>M. Allison, K. Singh, D. Bhattacharyya, J. Webb, S. Grant</i>	

Optimization of Cable Tensioning in Cable-Stayed Bridges	258
<i>M. M. Hassan, A. O. Nassef, A. A. El Damatty</i>	
Evaluation de la Vulnérabilité aux Aléas Naturels d'un Parc de Réservoirs en Béton dans un Système d'Information Géographique	271
<i>Hocine Hammoum, Karima Bouzelha, Dalila Bouhadoun, Faiza Belkacem</i>	
Surfactant Enhanced Removal of Cu (II), Cd (II), and Pb (II) from a Sandy Soil	282
<i>A. S. Ramamurthy, H. Shalchian</i>	
Phytoextraction of Zinc from Hydroponic Solutions by Plants	290
<i>A. S. Ramamurthy, M. Elektorowicz, E. Abbadi, A. Smoczynska</i>	
Engineering Characteristics of Ground Motion Records of the Val-des-Bois, Quebec, Earthquake of June 23, 2010	297
<i>Lan Lin, John Adams</i>	
External Protection of Reinforced Concrete Panels Subjected to Different Impact Loading	307
<i>M. Majeed, A. O. Abd El. Halim</i>	
Water Quality Modelling and Management Using Qual2kw in Shapour, Dalaki and Helleh Rivers, Iran	317
<i>B. Banihashemi, A. Karimi Jashni, K. Heydari</i>	
Wind Loading of a Wood Light-Frame Building	327
<i>I. Zisis, T. Stathopoulos, I. Smith, G. Doudak</i>	
Flexural Behavior of Ribbed Ferrocement Plates	337
<i>Ezzat H. Fahmy, Yousry B. I. Shaheen, Hala M. Refat</i>	
Seismic Induced Building Damage Assessment Using Bayesian Belief Network	347
<i>S. Tesfamariam, G. Hurlburt, J. Sun, T. Siraj</i>	
Cyclic Performance of Overloaded Beams Externally Post-Tensioned with CFRP Tendons	357
<i>A. El Refai, J. West, K. Soudki</i>	
Alternative Bracing Systems in Light-Wood Frame Buildings	366
<i>Abdullah Al Mamun, Ghasan Doudak, Chun Ni, Mohammad Mohammad, Y. H. Chui, Andi Asiz</i>	
Structural Behaviour of Steel Pipes Subjected to Denting Loads	376
<i>Abu Naim Md Rafi, Jorge Silva, Hossein Ghaednia, Halima Dewanabee, Sreekantha Das, Richard Kania, Rick Wang</i>	
Local Buckling in Corroded Steel Bridge Compression Members	385
<i>A. Krisciunas, M. Bartlett</i>	
Load Paths in Single Load Path Through-Truss Bridges – A Case Study	395
<i>S. Liu, F. M. Bartlett, W. Zhou</i>	
Helping Improve Older Driver Performance at Night: Results of Online Survey	405
<i>Said M. Easa, Maureen Reed</i>	
Investigation into Sustainable Development Strategies for the Department of National Defence	416
<i>T. Basso, N. Vlachopoulos</i>	
Integration of Sustainability in Undergraduate Engineering Programs	425
<i>Amy Vaillancourt, Jeff Rankin, Bruce Wilson</i>	
Detailed Investigation of an Area-Wide Environmental Compliance and Policy Study for Air Force Wings within the Canadian Forces	435
<i>N. Vlachopoulos, E. M. Skordaki, M. Simard, T. Basso</i>	
Decision Making Tool for Seismic Retrofitting of Non-ductile Reinforced Concrete Building	445
<i>Q. Al-Chatti, T. Siraj, P. Rajeev, S. Tesfamariam</i>	
Hysteretic Characteristics of Braced Frames in Modular Steel Buildings	456
<i>C. D. Annan, M. A. Youssef, M. H. El Naggat</i>	
Seismic Performance of Multi-Storey Light Wood Frame Buildings with Hybrid Bracing Systems	466
<i>Andi Asiz, Ying Hei Chui, Chun Ni, Mohammad Mohammad, Ghasan Doudak</i>	
Non-Destructive Technique (Impact-Echo) for Early Damage Detection of Concrete Structures	476
<i>N. Dawood, H. Marzouk, M. Lachemi</i>	
Nonlinear Finite Element Analysis of Thick Reinforced Concrete Plates Using Damage Plasticity Constitutive Model	486
<i>N. Dawood, H. Marzouk</i>	
Estimate of Cracking and Bond Splitting Stresses of RC Plates under Axial and Biaxial Tension	496
<i>N. Dawood, H. Marzouk</i>	
Wind-Induced Torsional Loads on Low-Rise Buildings: Effect of Geometrical Design Variables	507
<i>M. Elsharawy, K. Galal, T. Stathopoulos</i>	
Niche Areas for Mid-rise Light-frame Wood-Concrete Hybrid Construction	515
<i>J. Blaylock, F. M. Bartlett</i>	
Seismic Demand and Capacity of Braced Frames in Modular Steel Buildings	525
<i>C. D. Annan</i>	
Reliability Assessment of Steel-Free Deck System Bridges	533
<i>F. Ghodoosi, A. Bagchi, T. Zayed</i>	
Assessment of the Vulnerability of Buildings to Progressive Collapse due to Blast Loads	544
<i>Lan Lin, Nove Naumoski, Murat Saatcioglu, Simon Foo</i>	
Numerical Modelling of Mooney's Bay on the Rideau River	554
<i>S. Kheradmand, A. M. Mohammadian, O. Seidou, C. Rennie, T. Odyemi</i>	
Mathematical Optimization of Commercial Vehicle Parking Stalls in Urban Areas	566
<i>S. M. Easa, G. Dezi</i>	
Seismic Performance Evaluation of Reinforced Concrete Special, Intermediate and Ordinary Moment Resisting Frame Buildings	576
<i>H. Daneshvar</i>	

Passenger Rail Applicability: Opportunities and Challenges in Texas	587
<i>Todd Carroll</i>	
Effect of Shear Deformation on the Bridge Response in Vehicle-Bridge Interaction Dynamic Analysis	598
<i>H. Azimi, O. A. Pekau, K. Galal</i>	
Novel Anti-fouling L2MM/PVDF Membranes	608
<i>N. Pezeshk, R. M. Narbaiz, T. Matsuura</i>	
Climate Change Impacts on the Effectiveness of Controlled Tile Drainage in the South Nation River Watershed, Ontario, Canada	617
<i>Z. Que, O. Seidou, D. R. Lapen, R. L. Droste</i>	
Advanced Onsite Wastewater Treatment Using Hybrid Biological System	626
<i>S. Singh, J. Li, K. Onuma, N. Biswas</i>	
Dynamic Characteristics of Three Major Towers on Parliament Hill, Ottawa, from Recorded Vibrations during the Val-des-Bois, Quebec, Earthquake of June 23, 2010	637
<i>Lan Lin, John Adams, Jocelyn Paquette, Rock Glazer, Don Duchesne</i>	
Application of Wind Turbine Technology in Northern Canada and the Arctic	647
<i>P. Chang, J. Orellana, G. Akhras</i>	
Progressive Collapse Analysis of RC Shear Wall Buildings	657
<i>Omer Yagob, Khaled Galal, Nove Naumoski</i>	
Investigating the Economic Design of Airport Rigid Pavement on Expansive Clay Soil Using Waste Materials	667
<i>Abdelzaher E. A. Mostafa, Mohamed El-Sadek Ouf, M. Ibrahim</i>	
Variable Stiffness Smart Structure Systems to Mitigate Seismic Induced Building Damages	677
<i>K. Duerr, S. Tesfamariam, V. Wickramasinghe, A. Grewal</i>	
Strain Rate-Temperature Effect Evaluation in the Fractured Steel Bridge Bent during Earthquakes	687
<i>H. Tamura, E. Sasaki, H. Yamada, H. Katsuchi</i>	
Strength and Deformation Behaviour of Frozen Tailings Backfill	697
<i>F. S. Han, M. Fall</i>	
Recycling of High Density Tailings into Geotechnical Barrier Material for Waste Containment Facilities	707
<i>J. C. Célestim, M. Fall</i>	
Effect of Alkaline Pre-treatment on Anaerobic Digestion of Organic Fraction of Municipal Solid Waste	717
<i>R. Alqaralleh, R. Delatolla, K. Kennedy</i>	
Thermal-Hydraulic-Mechanical Behaviour of Gelfill under Undrained Condition Column	726
<i>N. Abdul-Hussain, M. Fall</i>	
Developing the Process, Resource, People and Change (PRPC) Approach to Municipal Water Infrastructure Sustainability Assessment	736
<i>J. Upadhyaya, E. K. L. Tam, N. Biswas</i>	
Contribution of Drywall Sheathing to Stiffness and Capacity of Axially Loaded Sheathed Stud Walls	747
<i>D. Grenier, F. M. Bartlett</i>	
Bond between GFRP Plates and Structural Steel Members – An Experimental Investigation	757
<i>Ramin Rameshni, Stefano Arcovio, Colin Macdougall</i>	
Development of Simulation Model for Evaluating Operational Performance of Railroad Networks	767
<i>S. Syed, S. Easa</i>	
Management of Municipal Solid Waste under an Uncertain Environment through a Hybrid Optimization Approach	777
<i>Pu Li, Bing Chen</i>	
Refinement of Design for a Parabolic Truss Structure for Solar Concentrating Photovoltaic Tracker System	788
<i>F. Gani, F. Légeron, R. Norman</i>	
Characterization of Historic Stone Masonry Buildings for Seismic Risk Assessment, Example of Old Quebec City	800
<i>Ahmad Abo-El-Ezz, Marie-José Nollet, Miroslav Nastev</i>	
Simultaneous Removal of Benzene and Copper From Contaminated Water Using Micellar-Enhanced Ultrafiltration	808
<i>Z. A. M. Ridha, C. N. Mulligan</i>	
Chloride Surface Transfer Coefficient of Concrete in Submerged Condition of Persian Gulf	818
<i>M. Nemat Chari, M. Shekarchi, P. Ghods, B. Ahmadi, S. Mahzarnia</i>	
Bridge Infrastructure Safety Assessment: Mitigating the Risk of Failure	828
<i>S. Abu Dabous, S. Alkass</i>	

Volume 2

Effective Use of Shear Stud Enhancement	835
<i>E. Rizk, H. Marzouk, A. Hussein</i>	
Evaluating Progress on Sustainable Infrastructure	845
<i>Catherine N. Mulligan</i>	
Structural Health Monitoring of Flexural and Shear Cracks	856
<i>E. Rizk, H. Marzouk, A. Hussein, X. Gu</i>	
Design Recommendations for the Use of the Partially Bonded FRP Strengthening System	866
<i>Han Choi, Jeffrey S. West, Khaled A. Soudki</i>	
Design and Application of Spiral Protruding Multi-disk Piles	874
<i>Mingdong Wang, Bin Yan</i>	

Effect of Incident Wave Angle on the Behaviour of Buried Pipe with Different Elbow Angles	879
<i>M. Saberi, F. Behnamfar, M. Vafaeian</i>	
Biological Sulfide Reduction in Sulfide-Rich Industrial Wastewater Using Batch Reactors	888
<i>A. Karimi-Jashni, T. Faraji, A. Niazi</i>	

JAG MOHAN HUMAR SYMPOSIUM

Seismic Hazard Maps for the National Building Code of Canada	896
<i>John Adams</i>	
Background to Some of the Seismic Design Provisions of the 2010 National Building Code of Canada	906
<i>Jag Mohan Humar</i>	
Computation of Fundamental Period for Seismic Design of Reinforced Concrete Buildings	919
<i>Murat Saatcioglu, Martha Dominguez Morales</i>	
Developments in NBCC for the Seismic Design of Reinforced Concrete Structures	931
<i>Denis Mitchell</i>	
Evolution of the Canadian Seismic Design Provisions for Steel Structures since 1989	941
<i>R. Tremblay</i>	

HIROSHI TANAKA SYMPOSIUM

Application of Wind Engineering for Building Envelope Designs	957
<i>A. Baskaran</i>	
Flutter Stability of Asymmetrically Erected Long-Span Suspension Bridges	965
<i>H. Yamada, H. Katsuchi</i>	
Three-dimensional Characteristics of Wind Flow Generated around Modular Shapes	971
<i>Elena Dragomirescu, Yarzar Tun</i>	
Advances in the Understanding of Wind-induced Cable Vibration Phenomena in the Subcritical and Critical Reynolds Number Regimes	979
<i>Shaohong Cheng, Arash Raeesi, David S.-K. Ting</i>	
Experiments on a Yaw Stay Cable in Turbulent Flow in the Critical Reynolds Number	990
<i>Guy L. Larose, Alberto Zasso, Stefano Giappino</i>	

2ND INTERNATIONAL ENGINEERING MECHANICS AND MATERIALS SPECIALTY CONFERENCE

State-of-the-Art Review of Retrofit Methodologies for Concrete Elements Subjected to Impact Loading	1000
<i>Imbeau Paul, Palermo Dan, Almansour Husham</i>	
Behaviour of a Low-Rise Concentrically Braced Frame Building with and without Dissipative Pin Connections	1010
<i>L. Tirca, C. Caprarelli, N. Danila</i>	
The Effect of Material Properties on Behaviour of Double Skin Profiled Composite Shear Wall	1020
<i>S. Rafiei, K. M. A. Hossain, M. Lachemi, K. Behdinin</i>	
Cylindrical Concrete Tanks with a Conical Base – Internal Force Discrepancies Between Different Analysis Tools	1030
<i>Mark Bruder</i>	
A Two Degree of Freedom Kinematic Model for Predicting the Deformations of Deep Beams	1040
<i>B. Mihaylov, E. C. Bentz, M. P. Collins</i>	
Modeling and Calibration for Crack Detection in Circular Shafts Supported on Bearings Using Lateral Vibration Measurements	1050
<i>A. Tlaisi, M. R. Haddara, A. Akinturk, A. S. J. Swamidas</i>	
An Approach to Testing the Performance of Steel Connections Subjected to Extreme Loading Scenarios	1061
<i>Steven A. Oosterhof, Robert G. Driver</i>	
Numerical Assessment of Seismically Retrofitted Low-Rise Shear Walls Using Shape Memory Alloys	1071
<i>W. L. Cortés-Puentes, D. Palermo, S. Foo</i>	
Effect of Fly Ash on Thermal Properties of Cement-based Foams Evaluated by Transient Plane Heat Source	1081
<i>Farnaz Batool, Vivek Bindiganavile</i>	
Environmentally Friendly Self-accelerated Concrete	1091
<i>A. M. Soliman, M. L. Nehdi</i>	
Early-age Behaviour of Wollastonite Micro-fiber Reinforced Concrete	1100
<i>A. M. Soliman, M. L. Nehdi</i>	
Effect of Exposure Conditions on Early-age Shrinkage of UHPC Thin Elements	1110
<i>A. M. Soliman, M. L. Nehdi</i>	
State of the Art Review of Stiffness and Strength Degradation Models for Seismic Response Analysis of Reinforced Concrete Structures	1118
<i>Silvena S. Reshotkina, David T. Lau</i>	
Improving the Energy Efficiency of Buildings with Hollow Core Slabs: A Numerical Investigation	1129
<i>H. B. Gunay, O. B. Isgor, A. G. Razaqpur, Simon Foo</i>	
Study on Influence of Shape Property for Angle of Repose	1138
<i>T. Horiguchi, H. Shibuya, S. Katsuki</i>	
Nonlinear Analysis of Shear-Critical Reinforced Concrete Frames under Impact, Blast and Seismic Loads	1149
<i>Serhan Guner, Frank J. Vecchio</i>	

Performance of Carbon Steels under Standard Fire Model	1160
<i>J. A. Trilleros S. Mato, I. Huertas</i>	
Concrete Innovative Admixtures and Coatings for Anti-Microbial Structures	1169
<i>Mohamed N. Abou Zeid, Ezzat Fahmy, Abdurrahman Awad, Somaya Ismail</i>	
Use of Waste Materials in Low Cost Housing	1178
<i>Mohamed N. Abou-Zeid, Ezzat Fahmy, Hany Armanious, Yasmine El-Moghazi, Samer Shaheen, Neveen Talaat</i>	
Combined Effect of Reinforcement Corrosion and Seismic Loads on RC Bridge Columns: Modelling	1188
<i>A. M. Mohammed, H. H. Almansour, B. Martín-Pérez</i>	
Use of Expanded Polystyrene Wastes for Production of Lightweight Mortar Mixes	1198
<i>Ezzat Fahmy, Youmna Ali, Mohamed N. Abou-Zeid, Mohamed Abdel Mooty, Medhat Haroun, Yousry B. Shaheen</i>	
Bond Characteristics of Glass Fibre Reinforced Polymer Bars Embedded in High Strength and Ultra-High Strength Concrete	1208
<i>D. Ametrano, K. M. A. Hossain, M. Lachemi</i>	
Splice Lengths in Ultra High Performance Concrete	1219
<i>C. Mak, K. M. A. Hossain, M. Lachemi</i>	
Mitigating the Expansion in Concrete Containing Reclaimed Aggregate Produced from Demolished Concrete Affected by Alkali-Silica Reaction	1229
<i>Medhat H. Shehata, Waleed Mikhaeel, M. Lachemi, Chris Rogers</i>	
Enhancement of Isogeometric Analysis Method for Analyzing 2D Cracked Problems Using Extrinsic Enrichment Functions	1238
<i>S. Sh. Ghorashi, N. Valizadeh, S. Mohammadi, H. Ghasemzadeh, S. Shojaee</i>	
On the Parameters Influencing Chemo-Physical Properties of Rice Husk Ash and Its Performance in Cement Mortars	1248
<i>A. Gholizadeh, A. R. Khaloo, S. Nasiri</i>	
Size Effects on the Mechanical Properties of UHPFRC	1256
<i>S. Kazemi, A. S. Lubell</i>	
Determination of Strain Rate Dependent Stress-Strain Curve up to Fracture for Mild Steel	1266
<i>Adam Walker, Jianwei Chen, Heng A. Khoo</i>	
Durable Concrete Incorporating Foundry Sand, Natural Pozzolans and Lightweight Aggregates	1276
<i>K. M. A. Hossain, O. Karahan, E. Sancak</i>	
The Effects of Supplementary Cementing Materials on Performance of Concrete Containing Alkali-Carbonate Reactive Aggregates of Marginal Expansivity	1285
<i>Medhat H. Shehata, Steven Jagdat, M. Lachemi, Chris Rogers</i>	
Effect of Cellulose and Polypropylene Fibers on the Residual Compressive Strength of Mortars at Elevated Temperatures	1295
<i>B. Kiani, T. Rahmani, M. Shekarchizadeh</i>	
Estimation Method of Inelastic Displacement Demands of Moment Resisting-Frame Buildings in Moderate Seismic Zones	1301
<i>S. H. Elkassas, M. A. Haroun</i>	
Effect of Mineral Admixtures on Rheology of Self Compacting Concrete	1311
<i>M. K. Rahman, M. A. Malik, R. Hameed, M. H. Baluch</i>	
Post-Peak Response of Plain Normal Strength Concrete Subjected to Monotonic and Cyclic Loading	1320
<i>B. Kadhom, D. Palermo</i>	
A 2-D Computational Fluid Dynamics Simulation of Slump Flow and L-Box Test on SCC Using ANSYS/FLUENT	1331
<i>M. H. Baluch, M. K. Rahman, F. Mukhtar, M. A. Malik</i>	
Coupled Damage and Chloride Diffusion Behaviour in RC Beams under Flexure	1339
<i>M. K. Rahman, M. A. Shazali, W. A. Al-Kutti, M. H. Baluch</i>	
An Inverse Problem Formulation for the Identification of Fracture Energy of Quasi-brittle Materials	1347
<i>Wafa Polies, Faouzi Ghrib, Shaohong Cheng</i>	
Evaluation and Comparison of Shear Design Guidelines for Beams Externally Wrapped with FRP	1357
<i>Cameron Marshall, Ahmad Rteil, M. Shahria Alam</i>	
Comparison of Shear Strength Equations for FRP Transverse Reinforcement	1367
<i>Robert Machial, Ahmad Rteil, M. Shahria Alam</i>	
Stochastic Finite Element Modelling of Reinforced Concrete Beams Affected by Reinforcement Corrosion	1375
<i>D. Baingo, B. Martín-Pérez</i>	
Size-Effects and Dynamic Fracture Parameters of Fibre Reinforced Cement-Based Foams	1385
<i>Muhammad Mamun, Vivek Bindiganavile</i>	
Steady State Response of Doubly Symmetric Thin-Walled Members under Harmonic Loads – Closed Form Solution	1395
<i>Mohammed Ali Hjadi, Magdi Mohareb</i>	
Steady State Response of Doubly Symmetric Thin-Walled Members under Harmonic Loads – Finite Element Formulation	1406
<i>Mohammed Ali Hjadi, Magdi Mohareb</i>	
Predicting Residual Stresses in Wide Flange Sections	1416
<i>Farhood Nowzartash, Magdi Mohareb</i>	
Column Curves for Members of Elliptical Hollow Sections	1425
<i>Farhood Nowzartash, Magdi Mohareb</i>	
Impact Response of Steel Fibre Reinforced Lightweight Concrete with Crumb Rubber	1434
<i>Rupak Mutsuddy, Vivek Bindiganavile, Adam S. Lubell</i>	

Performance Evaluation of a Multi-Span RC Bridge with Irregular Column Heights of Varying Ductility Levels	1445
<i>S. M. Reza, M. Shahria Alam, S. Tesfamariam</i>	
Evaluation of Fracture Parameters of Bond in Stone Masonry Units Bound with Fibre Reinforced Mortar	1455
<i>Md. Tohidul Islam, Vivek Bindiganavile</i>	
Seismic Retrofitting of Non-Ductile Reinforced Concrete Moment Resisting Frame Structures	1465
<i>Zaid Al-Sadoon, Murat Saatcioglu, Dan Palermo</i>	
The Behaviour of Recycled Aggregate Concrete at Elevated Temperatures	1475
<i>S. R. Sarhat, E. G. Sherwood</i>	
Performance of Micro-Limestone as a Partial Replacement of Cement	1486
<i>J. Camiletti, A. M. Soliman, M. L. Nehdi</i>	
Cast Iron Foundry Collector Dust Additive for Concrete	1494
<i>Travis Keegstra, Lee Poettcke, Lukas Bichler, Ahmad Rteil</i>	
Replacement of Fine Aggregate in Concrete with Foundry Slag	1500
<i>Brodie Pakalnis, David Zawierucha, Ahmad Rteil, Lukas Bichler</i>	
Effect of Elevated Temperature on the Properties of Steel Fiber Reinforced Concrete	1505
<i>Muhammad I. M. Rjoub</i>	
A New Phenomenological Model for Random Loading of MR/ER Damper	1514
<i>Kambiz Esteki, Ashutosh Bagchi, Ramin Sedaghati</i>	
CFD Analysis of Electro- and Magneto-Rheological Fluid Dampers	1522
<i>Kambiz Esteki, Ashutosh Bagchi, Ramin Sedaghati</i>	
Towards Improved Shear Design for Reinforced Concrete Beams Strengthened with Externally Bonded Fibre Reinforced Polymers	1531
<i>W. L. Cortés-Puentes, H. Almansour, D. Palermo</i>	
Evaluation of Deflection Equations for Concrete-Filled FRP Tube Beams	1541
<i>H.M. Mohamed, R. Masmoudi</i>	
Buckling Load Analysis of Concrete Filled FRP-Tube Columns	1552
<i>H.M. Mohamed, H. Abdel-Baky, R. Masmoudi</i>	
Freeze-Thaw Effects on the Behaviour of Concrete-Filled FRP Tube Columns	1563
<i>H. El-Zezafy, H.M. Mohamed, R. Masmoudi</i>	
Combined Effects of Thermal and Mechanical Loads on the Behaviour of FRP Reinforced Concrete Slabs– Theoretical and Experimental Studies	1573
<i>Hizia Bellakehal, Radhouane Masmoudi, Ali Zaidi, Bouhicha Mohamed</i>	
SDOF Analysis of Structures for Blast Resistant Design	1584
<i>E. Jacques, M. Saatcioglu</i>	
Strengthening of Non-Seismic Columns subjected to Explosive Loading with External Longitudinal CFRP	1594
<i>Alan Lloyd, Murat Saatcioglu, Timo K. Tikka</i>	
High Strain-Rate Effects on the Dynamic Material Properties of Wood Beams	1604
<i>Alan Lloyd, Eric Jacques, Omar Abdelalim, Murat Saatcioglu, Abass Braimah, Ghasan Doudak</i>	
The Effects of Different Mix Design Parameters on the Properties of Pervious Concrete	1614
<i>Bradley Maguire, Lara Yousif, Elizabeth Ramlochan, Medhat H. Shehata</i>	
Development of Sustainable Unshrinkable Fill Using Alternative Aggregate Sources	1625
<i>Maryam Kolahdoozan, Petar Filev, Fredi Petritaj, M. Lachemi, Medhat Shehata</i>	
Load-Strain Behaviour of Full Scale GFRP Poles under Cantilever Loading	1635
<i>S. Metiche, R. Masmoudi</i>	
Effects of Fibre Type on the Properties of Fibre-reinforced Self-Compacting Concretes	1646
<i>Erdogan Ozbay, M. Lachemi, Franck Cassagnebere, Kevin Grant, George Varavin</i>	
Performance of Repair Concretes in Marine Environments	1654
<i>Farnam Ghassemzadeh, Mohammad Shekarchi, Siavash Sajedi, Mohammad Javad Mohebbi, Mehdi Khanzadeh</i>	
Laboratory Evaluation of Pultruded Polyester and Vinylester GFRP Dowels for Concrete Pavement	1664
<i>Mathieu Montaigu, Mathieu Robert, Brahim Benmokrane</i>	
Punching Shear Strength of Flat Slabs Reinforced with Glass Fibre-Reinforced Polymer (GFRP) Bars	1675
<i>Mohamed Hassan, Christian Dulude, Ehab Ahmed, Brahim Benmokrane</i>	
Instantaneous Deflection of Slender Concrete Beams Reinforced with GFRP Bars	1685
<i>Amr El-Nemr, Ehab Ahmed, Brahim Benmokrane</i>	

Volume 3

Early-Age Cracking of Steel and GFRP-Reinforced Concrete Bridge Barriers	1695
<i>Jean-François Claude, Ehab Ahmed, Daniel Cusson, Brahim Benmokrane</i>	
Portland-limestone Cement - Reducing CO₂ Emissions in Cement Manufacturing	1705
<i>Richard J. McGrath</i>	

3RD INTERNATIONAL/9TH CONSTRUCTION SPECIALTY CONFERENCE

Modeling Measures of Resource Utilization with Singularity Functions	1714
<i>G. Lucko, R. C. Thompson Jr.</i>	
Modeling Measures of Float Allocation for Quantitative Risk Management of Construction Projects	1725
<i>R. C. Thompson Jr., G. Lucko</i>	

Modeling of Workforce Evolution in Construction Projects	1736
<i>Amin Alvanchi, Sanghyun Lee, Simaan M. Abourizk</i>	
The Evolution of Public-Private Partnerships in Public School Construction: North Toronto Collegiate Institute	1747
<i>M. Attalla, W. May</i>	
A Dynamic Model for Planning the Temporary Facilities in Congested Construction Sites	1756
<i>A. Abdel Fattah, J. Ruwanpura</i>	
Adaptive Learning Framework for Fuzzy Expert Systems for Construction Applications	1765
<i>Adel Awad, Aminah Robinson Fayek</i>	
A Fuzzy-Based Approach for Proactive Scheduling of Construction Projects	1776
<i>Naimeh Sadeghi, Aminah Robinson Fayek</i>	
Development of Scheduling with Hybrid Genetic Algorithm-Particle Swarm Optimization	1787
<i>Mehdi Tavakolan, Baabak Ashuri, Nicola Chiara</i>	
Heavy Civil Construction Operations: Increased Sustainability through Legislation, Codes, and Certifications	1797
<i>Thomas Korman, Na Lu</i>	
Work Zone Throughput Models for Southern Ontario	1807
<i>Bijan Ahmadi, Brenda McCabe, Susan Tighe, Mohammad Adnan</i>	
Use of Building Information Modeling (BIM) in Facilities Management	1815
<i>Francisco Forns-Samso, Susan M. Bogus, Giovanni C. Migliaccio</i>	
Improving Construction Productivity with Process Value Analysis (PVA): An Activity Based Study (ABS)	1825
<i>S. J. Jeyamathan, J. Y. Ruwanpura</i>	
Critical Causes of Changes in Oil and Gas Construction Projects in Alberta, Canada	1836
<i>Faisal Manzoor Arain</i>	
Project Based Fuel Use and CO₂ Emissions Performance of Construction Equipment	1846
<i>William Rasdorf, Phil Lewis, Steven Kelly Marshall, Ingrid Arocho</i>	
Predicting Preliminary Engineering Costs for Bridge Projects	1855
<i>William Rasdorf, Min Liu, Joseph E. Hummer, Donna A. Hollar</i>	
Construction Productivity: A Proposed Model to Improve Construction Price Indices in the United States	1864
<i>Bryan Dyer, Paul M. Goodrum, Kert Viele</i>	
Sustainability Assessment of Bridge Systems: An Emergy-based Lifecycle Analysis (EM-LCA)	1874
<i>Bahareh Reza, Rehan Sadiq, Kasun Hewage, Michael Roberts</i>	
Ergonomic Hazard Quantification and Rating of Residential Construction Tasks	1885
<i>Ndukeabasi Inyang, Mohamed Al-Hussein</i>	
Development and Implementation of a Construction Performance and Productivity Benchmarking Program	1896
<i>H. Nasir, C. Haas, A. R. Fayek, D. Forgues, J. Rankin, J. Ruwanpura</i>	
Post Simulation Visualization for Effective Scheduling of Modular Building Construction	1906
<i>Mansoor Moghadam, Elnaz Alyari-Tabrizi, Mohamed Al-Hussein, Saad Al-Jibouri, Avi Telyas</i>	
Design and Management of Transactions in the AEC/FM Industry Using an Ontological Approach	1916
<i>Jehan Zeb, Thomas Froese</i>	
Project Schedule Compression Using Multi-Objective Decision Support Methodology	1926
<i>Osama Moselhi, Nazila Roofigari</i>	
Impacts of Project Controls on Rework Induced Tipping Point Dynamics in Large, Complex Construction Projects	1936
<i>Jiang Li, Timothy R. B. Taylor, David N. Ford</i>	
Relational Contracting and High-Performance Project Outcomes	1946
<i>Islam H. El-Adaway</i>	
Intégration des Pratiques de Conception Intégrée et de Technologies de l'Information dans un Contexte de Travail Multidisciplinaire et Dispersé	1956
<i>D. Forgues, A. Lavallée, V. Laberge</i>	
Optimizing the Layout of Bridges Construction Sites Using Genetic Algorithms	1964
<i>M. Marzouk, M. Hisham</i>	
Une Plateforme Collaborative pour la Gestion de l'Information et la Connaissance	1972
<i>Erik Poirier, Daniel Forgues</i>	
Improving the Sharing of Information on Construction Project Sites Using a Chronographical Model	1982
<i>A. Francis, E. Miresco</i>	
Barriers to Real Options Adoption and Use in Construction Project Management Practice	1990
<i>David N. Ford, Michael J. Garvin</i>	
Optimizing Budget Allocation for Condition Assessment of Water and Sewer Infrastructures	2000
<i>Ahmed Atef, Hesham Osman, Osama Moselhi</i>	
Why CPS is Better than CPM?	2011
<i>Wail Menesi, Tarek Hegazy</i>	
Optimizing Construction Waste Reuse: A BIM Based Technological Approach	2019
<i>Atul Porwal, Kasun N. Hewage</i>	
Real-Time Information and Communication System to improve Construction Safety (C-RTICS²)	2028
<i>Gustavo E. Aguilar, Kasun N. Hewage</i>	
Contractual Obligations Analysis to Enhance Construction Waste Management	2040
<i>Daylath Mendis, Kasun N. Hewage</i>	
Generational Difference in Craft Workers' Perceptions of the Factors Affecting their Labour Productivity	2050
<i>Jiukun Dai, Paul M. Goodrum</i>	
Assessment of Activities Criticality Related to Cash Flow Parameters	2061
<i>Marwa Ahmed, Ashraf Elazouni, Tarek Zayed</i>	

Implementation of Weld-less Innovations on Construction Projects	2070
<i>Mahdi Safa, Michael C. Gouett, Carl T. Haas, Paul M. Goodrum, Carlos H. Caldas</i>	
Safe Floats Identification Using Qualitative Risk Analysis in Construction Projects Scheduling	2080
<i>Nima Gerami Seresht, Gholamreza Heravi</i>	
Managing Quality on the \$400M Sydney Tar Ponds and Coke Ovens Cleanup Project	2090
<i>Diane Ingraham</i>	
Planning for the Future: Developing the Detroit River International Crossing	2100
<i>Debra Brisk, Jennifer S. Shane</i>	
High Level Architecture (HLA) Based Simulation Framework for Modeling the Impact of Traffic Flows upon Concrete Construction	2109
<i>Y. Zhang, M. Lu, Z. J. Qiu, M. Hadiuzzaman, S. M. Abourizk</i>	
Design of a Tunnel Simulation Game for Teaching Project Control in Construction	2118
<i>Ronald Ekyalimpa, Saad Al-Jibouri, Yasser Mohamed, Simaan Abourizk</i>	
Factors that Influence the Decision to De-Energize Transmission and Distribution Lines for Electrical Contractor Safety	2129
<i>Alex Albert, Matthew R. Hallowell</i>	
Comparative Safety Risk Analysis of Highway Construction Work Tasks	2140
<i>Behzad Esmaili, Matthew Hallowell, Sangeeta Pandey</i>	
Statistical Analysis of Factors Affecting Availability of Water Pipelines	2150
<i>A. Singh, S. Adachi</i>	
Réduire l'Envergure des Changements dans les Projets de Construction Publics: Une Approche de Profilage des Compétences en Gestion de Projet	2160
<i>F. Chébil, D. Forgues</i>	
Carrying Over Integrated Project Delivery Concepts to a Non-IPD Project: A Comparative Case Study	2169
<i>Robert M. Leicht, Elena Enache-Pommer, Bryan W. Franz</i>	
Knowledge Management in Contract Administration: An Ontological Engineering Approach	2178
<i>Hesham Osman, Ahmed El Sherbiny, Osama Moselhi</i>	
Construction Data Preparation Framework Using Fuzzy Approach	2189
<i>Emad Elwakil, Tarek Zayed</i>	
How Can U.S. Contractors Work Under World Bank Funded Projects?	2199
<i>Salwa A. Fawzy, Islam H. El-Adaway</i>	
Structural Performance Model for Subway Systems	2209
<i>N. Semaan, T. Zayed</i>	
Analysis of a Rework Reduction Program for Construction Productivity Continuous Improvement	2219
<i>Di Zhang, Carl T. Haas, Paul Goodrum, Carlos H. Caldas, Robin Granger</i>	
Information Management Research in the Construction Industry	2229
<i>Ferzon Aziz, Jeff H. Rankin, Lloyd M. Waugh</i>	
Web-Based Project Management Action Research	2239
<i>Aaron C. Zutz, Charles T. Jahren, Jose A. Perez Reboredo</i>	
New Research Methods in CII	2249
<i>A. Wiesel, W. Badger, C. King</i>	
Facilitating Team Decision-Making through Reimbursable Contracting Strategies	2259
<i>Cindy L. Menches, Juan Chen</i>	
HSE Management Challenges in Iranian Civil Projects	2268
<i>F. Fallah, M. M. Mortaheb</i>	
Assessing Design Process in Engineering Consultancy Firms Using Lean Principles	2278
<i>M. Marzouk, I. Bakry, M. El-Said</i>	
Truck-Face Recognition Using Semantic Texton Forests	2288
<i>G. M. Jog, M.-W. Park, I. Brilakis</i>	
Simplified IT Tools for Site Information Tracking	2298
<i>Mohamed Abdel-Monem, Tarek Hegazy</i>	
Construction Productivity Improvement by Productivity Loss Prevention (PLP) Planning and Activity Based Implementation Techniques	2306
<i>Upul Ranasinghe, Janaka Ruwanpura</i>	
Estimating Productivity of Earthmoving Operations Using Spatial Technologies	2318
<i>A. Montaser, I. Bakry, A. Alshibani, O. Moselhi</i>	
Comparison of Point-Cloud Acquisition from Laser-Scanning and Photogrammetry Based on Field Experimentation	2328
<i>Mahmoud Ahmed, Adrien Guillemet, Arash Shahi, Carl T. Haas, Jeffrey S. West, Ralph C. G. Haas</i>	
Discrete Modelling and Simulation for Optimization and Planning	2339
<i>Arash Shahi, Mahdi Safa, Shahin Karimidorabati, Hassan Nasir, Carl T. Haas</i>	
Modeling User Behavior and Infrastructure Level of Service: An Agent-Based Simulation Approach	2349
<i>Hesham Osman, Ahmed Atef, Mohamed Zaki, Laila Naguib</i>	
Go/No-Go Decisions for BOT Projects	2359
<i>Bo Jiao, Saiedeh N. Razavi, Osama Moselhi</i>	
Indoor Construction Location Sensing Using Low Cost Passive RFID Tags	2369
<i>Saiedeh N. Razavi, Osama Moselhi</i>	
Negotiating Through Boundary Objects in Global Design Project Networks	2379
<i>Melissa K. Di Marco, Pauli Alin, John E. Taylor</i>	

Development of a Formal Change Order Pricing Procedure	2389
<i>William H. Lester, Timothy R. B. Taylor, Paul M. Goodrum, Yongwei Shan</i>	
Labour Productivity in Building Construction: A Field Study	2399
<i>Osama Moselhi, Rehab Aly, Ahmed Hassanein</i>	
A Conceptual Framework to Improve Information and Process Management in the Execution of Capital Projects	2409
<i>Samin Shokri, Mahdi Safa, Carl T. Haas, Ralph C. G. Haas</i>	
Maximizing Rehabilitation Benefits of Aging Transportation Networks	2419
<i>Wallied Orabi, Khaled El-Rayes</i>	
Field Evaluation of ZigBee-based Wireless Sensor Networks for Automated Resource Tracking on Construction Sites	2427
<i>X. S. Shen, M. Lu, B. Wei, W. Chen</i>	
Augmented-Reality Visualizations of Bored Pile Construction	2437
<i>Ming Fung Siu, Ming Lu</i>	
A Special Purpose Simulation Tool for Stochastic Precedence Network Scheduling	2447
<i>Jangmi Hong, Simaan M. Abourizk</i>	
Rapid Tracking of Pipe-Works Progress Using Digital Photogrammetry	2455
<i>Mahmoud Ahmed, Carl Haas, Arash Shahi, Afrooz Aryan, Jeffrey West, Ralph Haas</i>	
Preuve de Concept et Validation par Simulation de la Performance d'un Nouveau Mode d'Érection de Bâtiments	2466
<i>André Flora-Velinho, Daniel Forgues</i>	
Evaluation of Ultra-Wideband Technology for Position Location and Progress Tracking in Indoor Construction Environments	2474
<i>Afrooz Aryan, Arash Shahi, Jeffrey S. West, Carl T. Haas, Ralph C. G. Haas, Gary Caldwell</i>	
Planning to Reduce Variation in Construction Related Tasks	2485
<i>Brad W. Wambeke, Min Liu, Simon M. Hsiang</i>	
The Integration of a Stand-alone Discrete Event Modeling Environment into a Distributed Construction Simulation System	2495
<i>E. Moghani, S. M. Abourizk, S. Hague, S. Fernando</i>	
Optimal Material Logistics Planning in Congested Construction Sites	2505
<i>Hisham Said, Khaled El-Rayes</i>	
Using Innovative Technologies for Studying the Relationship between Construction Worker's Physical Strain and Performance: An Exploratory Study	2515
<i>U Gatti, G. C. Migliaccio, S. Schneider</i>	
Effectiveness of the Current Permitting Standards for Lane Closures	2525
<i>P. Berjis, B. McCabe</i>	
Distributed Simulation Modeling of Industrial Construction Processes Using Ontology-based Process Interaction Elements	2535
<i>Farzaneh Saba, Yasser Mohamed</i>	

Volume 4

Image Processing Based Automated Real-Time Construction Worker Tracking System	2545
<i>I. P. Tharindu Weerasinghe, Janaka Y. Ruwanpura, Jeffrey E. Boyd, Ayman F. Habib</i>	
Text Segmentation Methodology for Unstructured Construction Documents	2555
<i>T. Mahfouz</i>	
Early Involvement of the Mechanical Contractor to Improve Design Integration: A Comparative Case Study	2564
<i>Bryan W. Franz, Robert M. Leicht, David R. Riley</i>	
Monitoring and Quantification of Energy Savings Associated with Green Building Technologies – LEED Focused	2572
<i>D. Thebault, N. Vlachopoulos</i>	
Sensemaking During Technology Implementations by Project Teams	2582
<i>Timo Hartmann</i>	
Développement d'un Système d'aide à la Décision pour la Réorganisation des Réseaux Souterrains Sous la Future Plate-Forme d'un Tramway : Étude de Cas Tramway de Montréal	2593
<i>A. Michon, A. Francis, E. Felipe</i>	
Developing a Building Information Modeling Framework for Future Facility Projects on the Pennsylvania State University Campus	2602
<i>Craig R. Dubler, Colleen M. Kasprzak, John I. Messner, Edward J. Gannon</i>	
Regression-Based Prediction Methods for Adjusting Construction Cost Estimates by Project Location	2611
<i>Giovanni C. Migliaccio, Michele Guindani, Su Zhang, Sudipta Ghorai</i>	
Construction Contracts: From Zero-Sum to Win-Win	2620
<i>Ihab Mohammad Hamdi Saad</i>	
Building Information Modeling and Integrated Project Delivery: What is the Future?	2629
<i>Joseph Wright, Jason Charalambides</i>	
Vision-Based Equipment Detection in Construction Images	2639
<i>Ehsan Rezaazadeh Azar, Brenda McCabe</i>	
A Survey for the Current State of Knowledge Management within University Capital Projects Offices in the US	2649
<i>Bob Baldwin, Ken-Yu Lin, Giovanni Migliaccio, Tan Xiao</i>	
The Impact of Design Rework on Construction Project Performance	2659
<i>Ying Li, Timothy R. B. Taylor</i>	

Effect of Pipe Spool Sequence in Industrial Construction Processes	2669
<i>Di Hu, Yasser Mohamed</i>	
Engineering Productivity Comparison: 2D vs. 3D	2679
<i>Youngcheol Kang, Sungmin Yun, Sung-Joon Suk, Jiukun Dai, Stephen P. Mulva</i>	
Automatic Document Classification Using a Successively Evolving Dataset	2688
<i>Mohammed Al Qady, Amr Kandil</i>	
Conceptual Agent Based Framework for Construction Stakeholder Interactions in Sustainable Building Projects	2696
<i>Srinivasa Bhaskar Syam Nookala, Hisham Said, Amr Kandil, Hubo Cai</i>	
Evaluating the Long-Term Cost Effectiveness of LEED Canadian Schools	2706
<i>M. H. Issa, J. H. Rankin, M. Attalla, A. J. Christian</i>	
Financial Viability Evaluation for a Toll Road Project Considering Serviceability-Traffic Flow Dynamics	2716
<i>T. Jeerangsuwan, A. Kandil, H. Said</i>	
Dynamic Data Driven Simulation of Ongoing Construction Processes	2726
<i>Reza Akhavian, Amir H. Behzadan</i>	
Unolicited Proposals in Public-Private Partnerships Projects – Analysis of State Regulations in the USA	2736
<i>A. M. Abdel Aziz, H. Nabavi</i>	
Automated Progress Tracking of Erection of Concrete Structures	2746
<i>Yelda Turkan, Frederic Bosche, Carl T. Haas, Ralph Haas</i>	
A Survey on Tools for Measuring Contractors Performance by State DOTs	2757
<i>A. M. Abdel Aziz</i>	
Avatars, Text, and Miscommunication: The Impact of Communication Richness on Global Virtual Team Collaboration	2767
<i>Anne Anderson, Carrie Sturts Dossick, Josh Iorio, John E. Taylor, Gina Neff</i>	
Planning Multi-Project Construction Problems Using a Simulation-Based Auction Protocol	2776
<i>H. Taghaddos, U. Hermann, S. Abourizk, Y. Mohamed</i>	
Using the Treemap Data Visualization Technique to Study the Likelihood of Cost Overruns from Bidding Data	2786
<i>T. Williams, B. Traina, L. Whitehouse</i>	
A Data Collection Framework to Study Post Occupancy Performance of Green Buildings	2794
<i>Nathan Taylor, Elie Azar, Carol C. Menassa, John Nelson</i>	
Leveraging Industry Professionals to Improve Graduate Education in Construction Management: Lessons Learned from a Live Video-Conferencing Course	2804
<i>Jiukun Dai, Stephen P. Mulva, Wayne Crew, Karron G. Lweis</i>	
Decision Support for Flood Risk Management	2814
<i>Shohan S. Ahmad, Slobodan P. Simonovic</i>	
A Comparative Overview of Radio Frequency-Based Technologies Applicable to Locating Resources on Construction Sites	2825
<i>R. Maalek, F. Sadeghpour</i>	
A Lifecycle Energy and Cost Approach for Optimal Solar Screen Design	2836
<i>Ossama Hosny, Ahmed Elhakeem, Abbas El-Zafarany</i>	
Assessment of Financial Innovations as Real Options for Acceleration of Infrastructure Development	2847
<i>Ali Mostafavi, Dulcy M. Abraham, Charlene Sullivan, Vanessa Valentin</i>	
Energy Consumption Reduction Using Sustainable Building Envelopes’ Material in School Buildings	2858
<i>O. S. Alshamrani, S. Alkass, K. Galal</i>	
Integrating Sustainability with Building Information Modelling at the Conceptual Design Stage of Building Projects	2867
<i>Farzad Jalaei, Ahmad Jrade</i>	
Economics of Green Buildings	2877
<i>Satish B. Mohan, Benjamin Loeffert</i>	
Green Hybrid Deconstruction	2887
<i>Ian J. Macdonald, Satish B. Mohan</i>	
Natural Language Processing for Automated Regulatory and Contractual Document Analysis	2897
<i>D. M. Salama, N. M. El-Gohary</i>	
State-of-Art Review of Sustainability in Construction Management	2907
<i>A. Ghamsari-Esfahani, P. W. Save, T. Froese</i>	
Production Simulation for Prefab Housing Facilities	2917
<i>Helen Xie, Weiming Shen, Qi Hao, Haitao Yu, Yiliang Tang</i>	
Improving Risk Analysis in the Construction Industry	2927
<i>Hala Abourizk, Jesse Kostelyk, Simaan M. Abourizk, Brad Smid, Brad Griffith</i>	
A Novel Approach on Project Performance Monitoring and Overrun Probability Measurement Using Statistical Process Control Techniques	2937
<i>R. Mobtadi, M. M. Mortaheb</i>	

20TH CANADIAN HYDROTECHNICAL CONFERENCE

Determining the Roller Length of a Hydraulic Jump	2947
<i>A. Nazari G., Z. Musayev, K. Mammadov</i>	
Leakage Forensic Analysis for Water Distribution Systems: A Fuzzy-Based Methodology	2954
<i>M. Shafiqul Islam, Rehan Sadiq, Manuel J. Rodriguez, Alex Francisque, Homayoun Najjaran, Mina Hoorfar</i>	

Influence of Angle of Transition in Asymmetric Flow Distribution in Desanders.....	2965
<i>Daniel Sanchez</i>	
Optimization of a Kalman Filter for Improved aDcp Measurements Under High Real Bedload Condition	2975
<i>S. Kashyap, C. D. Rennie</i>	
The Potential Effects of Climate Change on the Vulnerability of Roads and Associated Structures, Greater Sudbury, Ontario.....	2985
<i>H. Arisz, M. Therrien, B. C. Burrell, M. M. Leblanc</i>	
Trends in New Brunswick Hydrometric Data.....	2995
<i>H. Arisz, S. Dalton, D. Scott, B. C. Burrell</i>	
Towards a Better Understanding of Flow Conditions in Culverts.....	3006
<i>J. Scott Toews, Shawn P. Clark, Nicholas Kehler</i>	
A Mesh-less Method Applied to Open Channel Flows.....	3016
<i>Jun Xie, Yee-Chung Jin</i>	
Modeling Flow Around Cylinders Using Mesh-free Particle Method.....	3024
<i>Lei Fu, Yee-Chung Jin</i>	
Characteristics of the Vegetation Cover for the St. Francois Watershed in Southern Quebec from Remote Sensing Data	3034
<i>M. A. Owrangi, S. S. Li</i>	
Flow Characteristics near Large Roughness Elements in Corrugated Culverts	3038
<i>A. Weiss, S. P. Clark</i>	
Numerical Study of Turbulent Jets: A Lagrangian Approach	3047
<i>Farshid Nazari, Yee-Chung Jin</i>	
Simulated Tsunami Bore Impact on an Onshore Structure.....	3056
<i>Taofiq Al-Faesly, Ioan Nistor, Dan Palermo, Andrew Cornett</i>	
Turbulence Characteristics of the Flow in a Corrugated Steel Pipe Culvert in the Context of Fish Passage	3066
<i>B. Yan, J. A. Kells, B. F. Sparling, M. E. Garner, T. J. McArthur, C. Katopodis</i>	
Hydrodynamic Simulations to Investigate Protection Alternatives Against Jellyfish Ingress	3076
<i>Mohamed K. Elkamash, Emad Heweedy, Mahad S. Baawain</i>	
Implementation and Evaluation of Near Wall Models along with LES.....	3086
<i>H. Shamloo, H. Bozorgian, M. Tavakoli Zadeh</i>	
Two-layer Velocity Profiles for Ice-covered Rivers: A Case Study	3096
<i>S. Attar, S. S. Li</i>	
Assessment of Hydrodynamic Impacts Throughout the Bay of Fundy and Gulf of Maine Due to Tidal Energy Extraction by Tidal Lagoons.....	3100
<i>J. Cousineau, A. Cornett, I. Nistor</i>	
Scour by a Submerged Vertical Circular Turbulent Impinging Jet in Natural Cohesive Soils.....	3111
<i>D. Cossette, K. A. Mazurek</i>	
Numerical Simulation of Large-Scale Shallow Flows Dominated by Rotation Effects	3121
<i>A. Mohammadian, A. Pilechi</i>	
Prediction of River Ice Formation on the Upper Nelson River Using Numerical Modelling	3130
<i>M. Bijeljanin, S. P. Clark</i>	
Uncertainties in the Estimation of Future Annual Extreme Daily Rainfall for the City of Saskatoon under Climate Change Effects	3140
<i>A.-R. Nazemi, A. Elshorbagy, S. Pingale</i>	
Experimental and Numerical Study of Turbulent Wall Jets.....	3151
<i>Abolghasem Pilechi, A. Majid Mohammadian, Colin Rennie</i>	
Groundwater in the Context of Integrated Water Management, Minqin Oasis, China	3159
<i>Brian C. Burrell, Huixi Xie, Todd Chan</i>	
Numerical Study of Turbulent Wake behind Different Obstacle Geometries Using RANS Models.....	3170
<i>S. S. Paul, M. S. Adaramola, O. M. Oyewola</i>	
Numerical Simulation of Turbulent Flow around a Pair of Rectangular Cylinders	3178
<i>M. S. Adaramola, S. S. Paul, O. M. Oyewola</i>	
Flood-Plain Roughness Effect on Flow Calculations in Compound Channel.....	3186
<i>Shouhong Wu</i>	
River Breakup Forecasting by Hydro-meteorological Data	3196
<i>Liming Zhao, Faye Hicks, Aminah Robinson Fayek</i>	
Groundwater Level Forecasting Using Data Pre-Processing and Artificial Intelligence Methods: Case Study in the Chateauguay Watershed, Quebec.....	3207
<i>J. Adamowski, H. Chan</i>	
Effect of Climate Change on Management of Surface Water of South Saskatchewan River Basin.....	3217
<i>Zahidul Islam, Thian Yew Gan</i>	
Potential Hydrologic Impact of Climatic Change to Regional Scale River Basins of Alberta and British Columbia	3227
<i>Ernst Kerkhoven, Thian Yew Gan, Zahidul Islam, Chun-Chao Kuo</i>	
Unconditional Uncertainties of Historical and Simulated River Flows Subjected to Climate Change.....	3238
<i>Ernst Kerkhoven, Thian Yew Gan, Chun-Chao Kuo, Zahidul Islam</i>	
Low Frequency Variability in Southwestern Canadian Stream Flow: Links with Large-Scale Climate Anomalies	3249
<i>Adam Kenea Gobena, Thian Yew Gan, Chun-Chao Kuo, Zahidul Islam</i>	
Precipitation of Southwestern Canada - Wavelet, Scaling, Multifractal Analysis, and Teleconnection to Climate Anomalies	3260
<i>Thian Y. Gan, Adam K. Gobena, Q. Wang, Zahidul Islam, Chun-Chao Kuo</i>	

SPH Modelling of Tsunami-Induced Hydrodynamic Forces on Columns	3271
<i>P. St-Germain, I. Nistor, R. Townsend</i>	
Morphological and Numerical Modeling of a Highly Dynamic Tidal Inlet at Shippagan Gully, New Brunswick	3282
<i>S. Logan, T. Faure, I. Nistor, A. Cornett, O. Seidou</i>	
A Three Dimensional Fuzzy Methodology for River Flood Risk Analysis	3292
<i>Shohan S. Ahmad, Slobodan P. Simonovic</i>	
Uncertainty Analysis of Contaminant Propagation in Water Distribution Systems	3303
<i>S. Mansour Rezaei, G. Naser, R. Sadiq</i>	
Dam Breaching Experiments Using Scale Series	3312
<i>M. Al-Riffai, I. Nistor, T. Bartens</i>	
Hill Creek Culvert Fish Passage Remediation	3323
<i>N. Schmidt, D. Ciobotaru, Z. Craciunescu, L. Purcka</i>	
Critical Shear Velocity Measurement Estimates Improved With In-Situ Flume	3333
<i>Craig De Vito, Kevin Mackenzie</i>	
A Suggested Approach to Optimising Contaminant Source Investment to Maximise Water Resources Returns	3343
<i>Greg Rose</i>	
Golder Daily Climate Record Generator	3353
<i>Christopher Davidson, Kevin Mackenzie</i>	
Stochastic Simulation of Daily Precipitation Using a Latent First-order Autoregressive Model	3359
<i>P. F. Rasmussen, W. Ng</i>	
TSS-Turbidity Relationships on the Nelson River System	3369
<i>R. Schmidt, M. R. Ahsan, H. Ahmari, M. E. St. Laurent, G. N. Cook, P. G. Hillius</i>	
Critical Review and Analysis of Nile Water Quality Data	3377
<i>M. Yousry, T. Salem, A. G. Awadallah</i>	
Probabilistic Water Quality Modelling Applied to the Mining Industry	3387
<i>Nicolas Lauzon, Tammy Rosner, Jerry A. Vandenberg, J. P. Bechtold</i>	
A Coupled Surface Water/Groundwater Model to Evaluate Residence Time and Location of the Hyporheic Flow in a Pool and Riffle Sequence	3395
<i>A. A. Ibrahim, P. M. Steffler</i>	
Author Index	