From Materials to Structures: Advancement through Innovation

Editors

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Preface

The organisers of the 22nd Australasian Conference on the Mechanics of Structures and Materials (ACSM22) extend a warm welcome to all participants whose presence and contributions will no doubt be a key factor for the success of this conference. This conference is hosted jointly by the Centre for Built Infrastructure Research at the University of Technology Sydney (UTS) and the Centre for Infrastructure Engineering & Safety at the University of New South Wales (UNSW). The theme for the 2012 ACSM conference is \textit{Materials to Structures: Advancement through Innovation}. The first Australasian conference on mechanics of structures and materials began at the University of New South Wales in 1967 as an initiative of the late Prof F.S. Shaw. Subsequently, these conferences have been held biennially as a forum for exchanging the latest research in the field of mechanics of structures and materials by researchers in the Australasian region and beyond. The last conference, ACSM21, was held at Victoria University in Melbourne in December 2010.

Over the forty-five year span and twenty-one conventions of the ACSM conferences, there has been continuous research growth in the understanding of infrastructure and the emergence of new and green materials has added more impetus and relevance to these conferences. The ACSM has become a biennial forum for academics, researchers and practising structural and construction engineers, as well as materials scientists in the region, fostering the exchange of ideas and detailing the research challenges in infrastructure development in our region.

The peer reviewed papers contained in these proceedings were accepted for presentation at ACSM22, held at the Aerial Function Centre, University of Technology, Sydney, Australia from 11-14 December 2012. The almost 200 papers were authored by academics, researchers and practising engineers from many countries around the world and cover a broad range of structural engineering and materials research under the following topics:

- Biomechanics
- Composite structures and materials
- Computational mechanics
- Concrete, masonry, steel and timber structures
- Earthquake engineering and structural dynamics
- Fire engineering
- Foundation engineering
- Geomechanics
- Innovative and smart structures
- Pavement engineering
- Rehabilitation of structures
- Rock engineering
- Site investigation
- Soil improvement and reinforcement
- Structural health monitoring
- Structural optimisation
- Sustainable materials

The abstracts submitted were initially reviewed by the organising committee and authors of those abstracts that fell within the scope of the conference were asked to submit full papers for peer review. All the papers included in these proceedings were subjected to rigorous review by the experts in relevant fields. This peer review process resulted in many papers being improved and some papers being rejected. The editors would like to acknowledge the contributions made to the conference by the Scientific Committee who undertook the task of reviewing all the submitted papers.

The editors would also like to thank all the keynote speakers, authors, participants and members of the local organising committee especially Dr. David Kellerman, Dr. Michael Man and Dr. Ean Tat Ooi, for their effort and support for this conference.

On behalf of the ACSM22 Organising Committee, we welcome you to exciting Sydney and hope that you find the conference inspiring and enjoyable.

Bijan Samali
Mario Attard
Chongmin Song
September 2012
Dynamic analysis of structures with interval parameters under random process earthquake excitations
C.W. Yang, C. Wang, W. Gao & C.M. Song

Fibre composites

Assessment of wollastonite microfibre on drying shrinkage behaviour of cement-based composites
N.L. Galas, P. Hamedanimojarrad, K. Vessalas & P.S. Thomas

Experimental study on the bondline behavior between concrete and FRP materials
S.A. Hadjighesh, R.J. Gravina, S. Senegaj & S.J. Kim

An experimental investigation of a thermal break composite façade mullion section
S. Huang, J. Li, B. Samali & M. Zobec

Mechanical properties of bamboo fiber-polyester composites
A.C. Manalo, W. Karunasena & K.T. Lau

Influence of hooked-end steel fibers on absorbed energy of slurry-infiltrated fiber concrete in flexural test
Y. Shafaei & O. Eren

Properties and behaviour of ganuti fibre composites under tensile and compressive load
A. Ticoali, T. Aravinthan & F. Cardona

Formula for SIF of cracked steel plates strengthened with CFRP plate

Fire engineering

Influence of in-situ pore pressures and temperatures on spalling of reinforced concrete walls subjected to hydrocarbon fire
M. Guerrieri & S. Fragomeni

Thermal performance of non-load bearing LSF walls using numerical studies
F. Kerkhan & M. Mahendran

Prediction of shear failure of hollowcore slabs exposed to fire

A review on fire protection for phase change materials in building applications
Q. Nguyen, T. Ngo & P. Mendis

Self-strengthening of structural steel members using shape memory alloys in fire
H. Sadiq, M.B. Wong, X.L. Zhao & R. Al-Mabaiti

Foundation and pavement engineering

Review of residential footing design on expansive soil in Australia
A.M.A.N. Karunarathna, E.F. Gad, S. Sivanerupan & J.L. Wilson

Analysis of pile group behaviour due to excavation induced ground movements
R. Nishanthan, D.S. Liyanapathirana & C.J. Leo

Inelastic lateral seismic response of building frames under influence of bedrock depth variations incorporating soil-structure interaction
H.R. Tabatabaeifar, B. Fatahi & B. Samali

Numerical and experimental investigations of stress wave propagation in utility poles under soil influence
N. Yan, J. Li, U. Dackermann & B. Samali

Geomechanics

Comparison of existing design methods for geosynthetic reinforced pile-supported embankments: Three-dimensional numerical modelling
F. Ariyaratne, D.S. Liyanapathirana & C.J. Leo
Review of diaphragm actions in domestic structures
I. Safiullah, E.F. Gad, J.L. Wilson, N.T.K. Lam & K. Watson

Study of blockage effect on scouring pattern downstream of a box culvert
S. Sorourian, A. Keshavarzi, B. Samali & J. Ball

Shock and impact loading

Fundamentals of impact actions demonstrated by miniature experimentations
M. Ali, J. Sun, N. Lam, L. Zhang & E. Gad

Numerical simulation of impact pile driving and its effect on far field
S.D. Banayako, D.S. Liyanapathirana & C.J. Leo

Effects of energy level and impact repetitions on the impact fatigue behaviour and post-impact
flexural properties of square FRP pultruded tubes
E.J. Guedes, T. Aravintian, A.C. Manalo & M.M. Islam

A novel adaptive base isolator utilizing magnetorheological elastomer
Y.C. Li, J.C. Li & B. Samali

Numerical modelling of composite textile subjected to impact loading
P. Tran, T. Ngo, E.C. Yang, P. Mendis & W. Humphries

Bio-inspired composite structure subjected to underwater impulsive loading
P. Tran, T. Ngo & P. Mendis

Numerical simulation of concrete spalling under impact
C. Wu & L. Shen

Simulation of pressure impulse diagrams for foam protected RC members
C. Wu & H. Sheikh

Impact analyses simplified by the two-degrees-of-freedom models
Y. Yang, N. Lam, L. Zhang & E. Gad

Steel and aluminium structures

Testing of steel-CFRP adhesive joints under freeze-thaw cycling
A. Agarwal, S. Foster, E. Hamed & Z. Vrcele

A new kinetic model for steel specific heat during phase transformation
H. Fang, M.B. Wong & Y. Bai

Finite element modeling of a beam-column connection in industrial storage racking structures
A. Firouzianhaji, A. Saleh & B. Samali

Shear tests of lipped channel beams with stiffened web openings
P. Koorahan & M. Mahendra

The use of neural networks for identification of parameters of semi-rigid connections
A. Kozlowski & L. Ziemiasz

Finite element modeling of existing cable net structures
G.J. Lune

Theoretical research on cold-formed channel sections under bending

Analysis of a railway turnout system with a spot replacement sleeper
A.C. Manalo, T. Aravintian & W. Karunasena

Stability reinforcement of steel plates by heat-induced stress deformation fields
N. Schillo, D. Schasfer & M. Foldmann

Numerical study of block shear strength of coped beams bolted with angles/toe-section
K.S. Seak, A.C.C. Lam & M.C.H. Yam