



UNIVERSITY OF CAPE TOWN



The Fifth International Conference on Structural Engineering, Mechanics and Computation

Cape Town, South Africa, 2-4 September 2013

Venue: Leslie Social Sciences Building, Upper Campus, University of Cape Town

FINAL PROGRAMME

Sunday 1 September

Welcome Reception: Leslie Social Foyer & Mezzanine Area

- 16:00-19:00** Onsite Registration & Collection of Conference Bags
17:00-17:30 Univ. of Cape Town Ceremony: Award of Hon DSc (Eng) to Prof. K.J. Bathe (USA)
18:00-19:00 Conference Welcome Reception

Monday 2 September

Opening Ceremony: Leslie Social Room LS2A

- 07:30-08:00** Tea and Coffee
07:30-10:00 Onsite Registration & Collection of Conference Bags
08:05-08:15 Introductory Remarks by the Conference Chair, Prof. A. Zingoni, Univ. of Cape Town
08:15-08:25 Welcome Address by the DVC for Research, Prof. D. Visser, Univ. of Cape Town

Tuesday 3 September

Conference Dinner: Old Mutual Campus Courtyard, Pinelands

- 19:00-22:30** Conference Dinner Function Co-Hosted with City of Cape Town. Dinner Speaker:
Alderman Ian Neilson, Deputy Executive Mayor, City of Cape Town

Monday 2 Sept, Tuesday 3 Sept, Wednesday 4 Sept

Plenary & Parallel Sessions: Leslie Social Rooms. General Programme Structure:

- 08:30-10:00** Plenary Session: 2 Keynote Lectures (45 minutes each)
10:00-10:30 Tea & Coffee Break
10:30-12:30 Parallel Sessions: 8 Streams (A to H)
12:30-13:30 Lunch Break
13:30-15:00 Parallel Sessions: 8 Streams (A to H)
15:00-15:30 Tea & Coffee Break
15:30-17:00 Parallel Sessions: 8 Streams (A to H)

Keynote Lectures

Monday 2 September: 08:30-10:00: Room LS2A

Chair: Prof. A. Astaneh-Asl, Univ. of California at Berkeley, USA

- 08:30-09:15 Prof. Yozo Fujino, University of Tokyo, Japan**
Recent studies on long-span bridges: Vibration control, seismic retrofit and monitoring in Japan
- 09:15-10:00 Prof. Juergen Bathe, Massachusetts Institute of Technology, USA**
Insights and advances in the analysis of structures

Tuesday 3 September: 08:30-10:00: Room LS2A

Chair: Prof. S. Schmauder, Univ. of Stuttgart, Germany

- 08:30-09:15 Prof. Rene De Borst, University of Glasgow, UK**
Mechanics of interfaces and evolving discontinuities
- 09:15-10:00 Prof. Dinar Camotim, Technical University of Lisbon, Portugal**
Local-distortional interaction in cold-formed steel columns: Non-linear behaviour, ultimate strength and DSM design

Wednesday 4 September: 08:30-10:00: Room LS2A

Chair: Prof. R.A. Smith, Imperial College London, UK

- 08:30-09:15 Prof. Wilfried Kraetzig, Ruhr University Bochum, Germany**
Simulation of multi-physical processes in solar updraft power generation
- 09:15-10:00 Prof. George Rozvany, Budapest Univ. of Technology and Economics, Hungary**
Recent controversies and new challenges in structural topology optimization

Parallel Session Presentations

These will run on each day from 10:30 until 17:00. After the morning plenary session, the rest of the day (on Monday, Tuesday & Wednesday) is divided into three time periods:

Period 1 (10:30-12:30); Period 2 (13:30-15:00); Period 3 (15:30-17:00)

Eight streams of parallel presentations (each allocated its own venue) will run throughout the Conference. These streams are defined in terms of the topics covered, as follows:

Stream A: Dynamic Response; Vibration Analysis; Vibration Control; Vibration Serviceability; Human-Structure Interaction; Non-Linear Dynamics; Seismic Response; Seismic Analysis; Earthquake-Resistant Design

Stream B: Material Modelling; Composite Materials; Functionally-Graded Materials; Biological Modelling; Numerical Simulations; Finite-Element Modelling; Blast; Impact; Damage Mechanics; Fracture; Fatigue; Engineering Education

Stream C: Wind Loading; Computational Wind Engineering; Tall Buildings; Robustness; Progressive Collapse; Bridge Girders; Bridge Engineering; Lightweight Structures; Roof Systems; Cables; Bars; Rods; Foundations; Geotechnics

Stream D: Steel Structures: Stability, Strength & Design; Cold-Formed Steel Structures; Stainless Steel Structures; Aluminium Structures; Thin-Walled Sections (Other Steel-Related Topics are in Stream H)

Stream E: Concrete Structures; RC Design; Durability; Creep; Shrinkage; Transport Processes; Fibre-Reinforced Concrete; Cement Composites; High-Performance Concrete; Construction Materials; Construction Technology; Building Performance

Stream F: Performance of Structures in Fire; Design for Fire Resistance; Structural Safety; Structural Reliability; Risk Assessment; Structural Optimisation; Masonry Structures; Timber Structures

Stream G: Structural Health Monitoring; Damage Detection; Non-Destructive Evaluation; Structural Assessment; Damage Assessment; Disaster Management; Failure Analysis; Forensic Engineering; Repair; Strengthening; Retrofitting

Stream H: Structural Engineering for Renewable Energy; Plates; Shells; Laminated Composites; Sandwich Structures; Steel Joints & Connections; Steel-Concrete Composite Construction; Thin-Walled Sections

Programme for Parallel Sessions

The Programme for Parallel Sessions is presented below, stream by stream. The session code has 3 characters: the first is a letter indicating the **day** (Mon, Tue or Wed), the second is a number indicating the time **period** (1, 2 or 3), and the third is a letter indicating the **stream**. For example, T3D denotes the parallel session that runs on Tuesday in Period 3 (15:30-17:00) as part of Stream D.

Stream A: Room LS2A

Session M1A: Dynamic Response, Vibration Analysis, Vibration Control I

Chair: Prof. P. Reynolds, Univ. of Exeter, UK

10:30: General conditions for instantaneous system inversion in structural dynamics, K. Maes, E. Lourens, G. De Roeck, G. Lombaert

10:45: Determination of aerodynamic damping of twin cables in wet conditions through passive-dynamic wind tunnel tests, M.B. Eriksen, E. Mattiello, C.T. Georgakis

11:00: Frequency domain stochastic response of structural systems with uncertain parameters: Closed-form sensitivity, G. Muscolino, R. Santoro, A. Sofi

11:15: Semi-active control of structural systems with uncertainties using an unscented Kalman filter, M.S. Miah, E.N. Chatzi, F. Weber

11:30: Guided waves for stress identification, A. Pau, G. Ruta, F. Vestroni

11:45: Unscented Kalman Filter for the identification of passive control devices, R. Ceravolo, A. De Stefano, E. Matta, A. Quattrone, L. Zanotti Fragonara

12:00: Vibration elimination analysis of simply-supported bridge under moving loads based on Laplace-Carson integral transform, K.P. Wang, H. Xia, W.W. Guo

12:15: Dynamic identification of Palazzo Marchesale in S. Giuliano di Puglia, G. Bongiovanni, G. Buffarini, P. Clemente, D. Rinaldis, F. Saitta, M. Nicoletti, A. De Sortis, G. Rossi

Session M2A: Dynamic Response, Vibration Analysis, Vibration Control II

Chair: Prof. J. Ambrosio, Technical Univ. of Lisbon, Portugal

13:30: Vibrations of cables with bending stiffness by an asymptotic approach, T. Canor, V. Denoel

13:45: A suspended mass damper for torsional and translational vibration control, M. Carlisle, K. Li

14:00: Status quo and critical review of PPV safe limits for subsurface construction blasting close to low-rise buildings, E.Y. Sayed-Ahmed, K.K. Naji

14:15: Dynamic response of rigid pavement under moving traffic load with variable velocity, Y. Zhong, M.J. Xu

14:30: Dynamic response of airport building structure due to construction machinery effects, J. Bencat, D. Papan

Session M3A: Special Session: Vibration Serviceability & Human-Structure Interaction

Organisers: Prof. A. Pavic, Univ. of Exeter, UK & Dr. V. Racic, Univ. of Sheffield, UK

Co-Chairs: Prof. A. Pavic, Univ. of Exeter, UK & Dr. V. Racic, Univ. of Sheffield, UK

15:30: Data-driven model of random lateral pedestrian excitation, V. Racic, J.M.W. Brownjohn, A. Pavic

15:45: Simultaneous registration of walking behaviour and structural response, K. Van Nimmen, P. Van den Broeck, G. Lombaert, G. De Roeck

- 16:00:** Vibrations in a multi-storey lightweight building structure: Influence of connections and nonstructural mass, L.V. Andersen, P.H. Kirkegaard
- 16:15:** Direct velocity feedback versus a geometric controller design of remotely located vibration control systems, D.S. Nyawako, U. Ubaid, P. Reynolds, M.J. Hudson
- 16:30:** Sensitivity analysis of coupled crowd-structure system dynamics to walking crowd properties, E. Shahabpoor, A. Pavic, V. Racic
- 16:45:** Experimental study of the human ability to deliberately excite a flexible floor, C. Schwartz, A. Berger, O. Bruels, B. Forthomme, J-L. Croisier, V. Denoel

Session T1A: Special Session: Computational Methods in Non-Linear Dynamics
Organisers: Prof. M. Wiercigroch & Dr. J. Paez Chavez, Univ. of Aberdeen, UK
Co-Chairs: Prof. M. Wiercigroch & Dr. J. Paez Chavez, Univ. of Aberdeen, UK

- 10:30:** Dynamics of structural components subjected to large rotations using a flexible multibody approach, J. Ambrosio, M.A. Neto (Invited Paper)
- 11:00:** Bifurcation analysis of a Jeffcott rotor with a bearing clearance: Numerics and experiments, J. Paez Chavez, M. Wiercigroch, S.V. Vaziri Hamaneh
- 11:15:** A hybrid time-frequency procedure for the solution of nonlinear dynamic problems, F.N. Correa, B.P. Jacob
- 11:30:** Singularities that induce a breakdown of determinism in mechanics, M.R. Jeffrey
- 11:45:** A computational study of the upper Lyapunov exponent and the uniform persistence for monotone skew-product semiflows, J.A. Calzada, R. Obaya
- 12:00:** Nonlinear dynamics of a rotating SD oscillator, Q. Cao, N. Han, M. Wiercigroch
- 12:15:** On the dynamics of stacks of rigid blocks, F. Saitta, P. Clemente, D. Rinaldis
- 12:30:** Numerical bifurcation analysis of an impact oscillator with drift, J. Paez Chavez, M. Wiercigroch, E.E. Pavlovskaja

Session T2A: Special Session: Seismic Behaviour & Earthquake-Resistant Design of Long-Period Structures. Organiser: Prof. A. Astaneh-Asl, Univ. of California at Berkeley, USA
Chair: Prof. A. Astaneh-Asl, Univ. of California at Berkeley, USA

- 13:30:** Seismic behaviour and earthquake resistant design of long period structures, A. Astaneh-Asl (Invited Paper)
- 14:00:** Yokohama-Bay cable-stayed bridge seismic response analysis during the 2011 Great East Japan Earthquake, Y. Fujino, D.M. Siringoringo
- 14:15:** Thinking outside the box: Integrated seismic system evolution in high rises, M. Sarkisian, N. Mathias, E. Long
- 14:30:** Seismic design of the self anchored suspension bridge: San Francisco Oakland Bay Bridge, M. Nader, B. Maroney
- 14:45:** Seismic performance of an asymmetric base-isolated building in the 2011 Great East Japan Earthquake, Y. Fujino, D.M. Siringoringo

Session T3A: Seismic Response, Seismic Analysis, Earthquake-Resistant Design I
Chair: Prof. Y. Fujino, Univ. of Tokyo, Japan

- 15:30:** Future development of the European seismic code - Eurocode 8, E.D. Booth
- 15:45:** Large-scale dual shake table testing: An experimental approach to study the non-uniform excitation effects on long span bridges, M.M.S. Cheung, C.Y. Yang, Y. Pan, F. Xiong
- 16:00:** Large natural draft cooling towers under earthquake excitation, M. Andres, D. Casucci, R. Woermann
- 16:15:** Numerical investigation of the cyclic response of CHS braces, T. Sheehan, T.M. Chan, L. Gardner
- 16:30:** Characterization of the seismic behaviour of steel pallet racks in cross-aisle direction, C. Braham, H. Degee

16:45: Assessment of evaluation methods of dynamic response of multi-span bridge to mining tremor, J.M. Dulinska, M. Fabijanska-Kopacz

Session W1A: Seismic Response, Seismic Analysis, Earthquake-Resistant Design II

Chair: Prof. I.N. Robertson, Univ. of Hawaii, USA

10:30: Dynamic shakedown design of structures under repeated seismic loads, S. Benfratello, L. Palizzolo, P. Tabbuso

10:45: Performance of buildings and other structures during the Tohoku Tsunami, I.N. Robertson, G. Chock

11:00: Parametric identification of building structures with seismic recordings, R. Zhang, L.O. Gargab

11:15: Passive energy dissipation characteristics of yielding shear panel device produced from steel and stainless steel, M. Ashraf, M.R. Hossain

11:30: Nonlinear behaviour of submerged floating tunnels accounting for seaquake effects, C.X. Shi, M. Domaneschi, L. Martinelli

11:45: Multi-storey steel structures: Seismic energy modal distribution, O. Prodan, I. Ladar, N. Chira

12:00: Generation of spectrum compatible site-dependent earthquake load histories by evolutionary approach, F. Carli, C. Carino

Session W2A: Seismic Response, Seismic Analysis, Earthquake-Resistant Design III

Chair: Mr. E. Booth, Consulting Engineer, UK

13:30: Bidirectional pushover analysis of irregular structures, G.P. Cimellaro, D. Lopez-Garcia, T. Giovine

13:45: Effect of basement rigidity on seismic response of RC buildings, A. Kocak, M. Borekci, A. Kalyoncuoglu, E.C. Ekinici

14:00: An innovative solution for earthquake resistant hybrid steel-concrete systems with replaceable dissipative steel links, A. Zona, G. Leoni, A. Dall'Asta, T. Bogdan, C. Braham, H. Degee

14:15: Effectiveness of seismic protection by added damping: An energy approach, I. Ladar, O. Prodan, N. Chira

14:30: Seismic behaviour of exposed column bases in buckling-restrained braced frames, Y. Cui, S. Kishiki, S. Yamada

Session W3A: Seismic Response, Seismic Analysis, Earthquake-Resistant Design IV

Chair: Prof. R.R. Zhang, Colorado School of Mines, USA

15:30: Seismic collapsing response analysis of wooden house retrofitted by ACM braces, T. Takatani, H. Nishikawa

15:45: Experimental study on the performance of hollow reinforced concrete bridge piers subjected to lateral seismic loads, O. Lopez-Batiz, R. Gomez-Martinez, J.A. Escobar-Sanchez, F. De la Serna-Hernandez, G. Aguilar-Ramos

16:00: Seismic safety screening method (SSSM) for slum clearance, P.O. Caglayan

16:15: Evaluating the seismic performance of RCC dams subjected to near-field and far-field earthquakes via FEA approach, M.R.A. Ala, H.R. Vosoughifar, N. Hasani, S.K.S. Shokouhi

Stream B: Room LS1A

Session M1B: Material Modelling & Composite Materials

Chair: Prof. R. De Borst, Univ. of Glasgow, UK

10:30: Thermodynamics-based constitutive modelling of coupled dissipative phenomena in engineering materials, H. Egner, W. Egner, M. Rys

10:45: Numerical implementation of the Hoek-Brown material model with strain hardening, E.S. Sorensen, J. Clausen, L. Damkilde

- 11:00:** Simulation of the mechanical behaviour of W/Cu composites containing FGM related interpenetrating microstructures under consideration of phase dependent damage limits, S. Schmauder, U. Weber
- 11:15:** Determination of effective elastic constants of two phase composites, O. Bulut, N. Kadioglu, S. Ataoglu, M. Yuksek, E. Sancak
- 11:30:** Strain induced product properties of magneto-electric composites, J. Schroeder, M.A. Keip, M. Labusch, D.C. Lupascu
- 11:45:** Microstructural image-based modelling of weld failure, O. Barrera, A.C.F. Cocks, E. Tarleton
- 12:00:** Flame straightening application on structural steels: Effects on mechanical and fracture properties, R. Lacalle, J.A. Alvarez, D. Ferreno, J. Portilla, E. Ruiz, B. Arroyo, F. Gutierrez-Solana

Session M2B: Material & Biological Modelling

Chair: Dr. O. Barrera, Univ. of Oxford, UK

- 13:30:** Numerical properties of second-order integration algorithms for plasticity models, M. Jahanshahi
- 13:45:** Biological tissue mechanics with fibres modelled as one-dimensional Cosserat continua: Applications to cardiac tissue in healthy and diseased states, K. Sack, S. Skatulla, C. Sansour
- 14:00:** Statistically similar RVE construction based on 3D dual-phase steel microstructures, L. Scheunemann, D. Balzani, D. Brands, J. Schroeder, D. Raabe
- 14:15:** A study of local mechanical properties of 304L SS welded joints subjected to cyclic straining using depth-sensing instrumented indentation, D. Ye, F. Mi, X. Yin
- 14:30:** Identification of nonlinear hyperelastic material parameters for healthy myocardial tissue via an inverse method based on modelling the passive filling stage of the cardiac cycle, M. Essack, S. Skatulla

Session M3B: Numerical Simulations & Finite-Element Modelling I

Chair: Prof. K.J. Bathe, Massachusetts Institute of Technology, USA

- 15:30:** A layered shell element for the thermal analysis of plates exposed to non-uniform heating, A.E. Jeffers
- 15:45:** Co-rotational FEM for fast geometrically nonlinear static and dynamic algorithms, D. Marinkovic, M.W. Zehn
- 16:00:** Nonlinear static and dynamic analysis of an electrically-actuated microbeam modelled by means of the strain gradient elasticity theory, P. Belardinelli, S. Lenci
- 16:15:** Peak shear stress distribution in finite element models of concrete slabs, E.O.L. Lantsoght, C. van der Veen, J.C. Walraven, A. de Boer
- 16:30:** Finite element modelling of shear tab connections including damage simulation, A. Mirzaei, C.A. Rogers, R. Tremblay
- 16:45:** Material influence on the strength of aluminium column web in tension, G. Sarracco, G. Brando, G. De Matteis

Session T1B: Numerical Simulations & Finite-Element Modelling II

Chair: Prof. M.W. Zehn, Technical Univ. of Berlin, Germany

- 10:30:** Elimination of slip-locking in composite beam analysis by using a meshfree method, R.E. Erkmén
- 10:45:** Coupling different FE models for the calculation of the thermo-mechanical behaviour of ultra high-performance concrete components under high temperature load, M. Siemon, D. Hosser, J. Zehfuss
- 11:00:** Buckling analysis of thin composite plates reinforced by carbon nanotubes using finite strip methods, M. Pazoki, M. Azhari, A. Heidarpour
- 11:15:** FE modelling of semi-rigid flush end plate joints with concrete-filled steel tubular columns, A. Ataei, M.A. Bradford
- 11:30:** Optimization of the injection molding processes using the Moldflow simulation program on the example of electrical connectors, M. Szostak, R. Staniek
- 11:45:** Development and testing of a technique for the simulation of the rock cutting process, M.J. Mikl, R. Tichy, W. Ecker, T. Antretter, G. Pittino

12:00: Nonlinear analysis of semi-rigid steel frames subjected to blast or fire, A. Heidarpour
12:15: Comparison of simulation results of injection molding process obtained by Moldflow and Moldex3D programs, M. Szostak, R. Staniek

Session T2B: Blast & Impact

Chair: Prof. G. Nurick, Univ. of Cape Town, South Africa

13:30: Interaction forces between huge cargo vessels and quay walls, M. Bahr, V. Sigrist
13:45: Impact velocity and initial length influence on the crushing behaviour of TWCF open section members under axial impact, M. Kotelko, R.J. Mania, M. Jankowski
14:00: Computational modelling of reinforced concrete wall subjected to transformer tank rupture, M.A. Seman, M.A. Nasly, Y.T. Feng, Z.M. Jaini
14:15: Response of a building envelope system to near-field blast events, H.D. Hidallana-Gamage, D.P. Thambiratnam, N.J. Perera
14:30: Blast test and numerical simulation of point-supported laminated glass curtain wall, S. Chen, C.G. Zhu, G.Q. Li, Y. Lu

Session T3B: Damage Mechanics, Fracture & Fatigue I

Chair: Prof. E. Detournay, Univ. of Minnesota, USA

15:30: Heterogeneous structures studied by an interphase elasto-plastic damage model, G. Giambanco, G. Fileccia Scimemi, A. Spada
15:45: A coupled local-nonlocal framework for modeling hydraulic fracturing in the Karoo, D.Z. Turner
16:00: Experimental evaluation of the fretting fatigue behaviour of high-strength steel monostrands, J. Winkler, C.T. Georgakis, G. Fischer
16:15: The use of the theory of critical distances in fracture and structural integrity assessments, S. Cicero, V. Madrazo, I. Carrascal, T. Garcia
16:30: Fracture mechanics as an improvement of fatigue life assessment in orthotropic bridge decks, W. Nagy, H. De Backer, P. Van Bogaert
16:45: Analogies in the fracture mechanisms of concrete and ice, B. Chiaia, A.P. Fantilli, B. Frigo

Session W1B: Damage Mechanics, Fracture & Fatigue II

Chair: Prof. S. Lenci, Polytechnic Univ. of Marche, Italy

10:30: Hydraulic fracture simulation: Comparison with exact solutions, C. Detournay, P.A. Cundall, B. Damjanac
10:45: Propagation of non-planar pressurized cracks from a borehole, J.A.L. Napier, E. Detournay
11:00: An investigation of the double torsion geometry using peridynamics, T.H. Becker, D.Z. Turner
11:15: Assessment of fracture toughness in strain hardening cement-based composite (SHCC) made from fine and coarse sand, S.C. Paul, G.P.A.G. van Zijl
11:30: Optimisation of the double torsion geometry, S.P. Goqo, S. Skatulla, T.H. Becker
11:45: An experimental validation of residual stresses in weld clad pipelines, G. Schnier, J. Wood, A. Galloway
12:00: Polymeric facades: Fatigue performance of pultruded panel connections, P.T. Gates, T.J. Ibell, A.P. Darby, M. Evernden
12:15: Tensile and compressive buckling of shear deformable damaged beams, S. Caddemi, I. Calio, F. Cannizzaro

Session W2B: Special Session: Structural Engineering Education

Organiser: Dr. U. Quapp, HTWK Leipzig Univ. of Applied Sciences, Germany

Chair: Dr. U. Quapp, HTWK Leipzig Univ. of Applied Sciences, Germany

13:30: Efforts to reduce the drop-out rate in civil and structural engineering programs, U. Quapp, K. Holschemacher (Invited Paper)

14:00: Teaching and learning of fundamentals of structural engineering at undergraduate level, M.R. Karim

14:15: Structural stability and the complement to the differential equation, R.D. Ziemian

14:30: International master program in structural engineering at Leipzig University of Applied Sciences (HTWK Leipzig), K. Holschemacher, U. Quapp

Stream C: Room LS1B

Session M1C: Wind Loading & Computational Wind Engineering

Chair: Prof. H.J. Niemann, Ruhr Univ. Bochum, Germany

10:30: Revised wind loading for linear and non-linear design of cooling towers, H-J. Niemann, W. Hubert (Invited Paper)

11:00: Wind-tunnel investigations of pressure distribution over high-rise buildings, M. Cwik, A.M. Goliger, M.A. Gizejowski

11:15: Probabilistic models for design of structures against wind loads, J.V. Retief, C. Barnardo-Viljoen, M. Holicky

11:30: Computational fluid dynamics simulations and validation of results, M.A. Sitek, M. Cwik, A.M. Goliger, M.A. Gizejowski

11:45: Equivalent static wind loads for structures with non-proportional damping, N. Blaise, T. Canor, V. Denoel

Session M2C: Tall Buildings, Robustness, Progressive Collapse I

**Co-Chairs: Mr. N. Mathias, Skidmore Owings & Merrill LLP (SOM), USA
& Dr. A. Heidarpour, Univ. of Monash, Australia**

13:30: Robustness of structures: State of art, Seema, N. Baldassino, R. Zandonini

13:45: Performance-based plastic design of earthquake resistant tall building frames, W.C. Liao, M.R. Bayat, S.C. Goel

14:00: More optimal seismic design of highrise structures using nonlinear analysis techniques, S.A. Ashrafi

14:15: Progressive collapse prevention of drive-in steel storage racks, S. Yadwad, L.H. Teh

14:30: Assessment of column removal time for progressive collapse evaluation of high rise structures, O.D. Stephen, D. Lam, V.V. Toropov

Session M3C: Tall Buildings, Robustness, Progressive Collapse II

Dr. S.A. Ashrafi, Thornton Tomasetti, USA

15:30: Rotational capacity of concrete slabs and its influence on tensile membrane action in the framework of robustness analysis, D. Gouverneur, R. Caspeele, L. Taerwe

15:45: A modal property analysis of linked tall buildings using a matrix model, K.T. Tse, J. Song

16:00: The impact of fire scenario on the collapse of a tall structure, S. Selamet

16:15: Behaviour of tall buildings under blast loading with direct simulation method, F. Fu

16:30: Parametric study of pyramid-like tubular structure, G.S. Liou, H.C. Kuo

Session T1C: Special Session: Bridge Girders & Bridge Engineering I

Organisers: Dr. R. Vieira & Prof. F. Virtuoso, Technical Univ. of Lisbon, Portugal

Co-Chairs: Dr. R. Vieira & Prof. F. Virtuoso, Technical Univ. of Lisbon, Portugal

10:30: Analysis of steel and steel-concrete bridge girders through a higher order beam model, R.F. Vieira, F.B. Virtuoso, E.B.R. Pereira (Invited Paper)

11:00: Composite steel-concrete cable-stayed bridges: Developments and future trends, J.J. Oliveira Pedro, A.J. Reis

11:15: Full-scale testing of concrete deck slabs under fatigue-causing axle loads, G. Borkowski,

K. Thoma, P. Roos

11:30: Cable stressing sequence of an asymmetrical cable stayed bridge, J.R.B. Anderson

11:45: Design curves for stiffened flanges used in steel box girder bridges, P.S. Ferreira, F. Virtuoso

12:00: Fatigue life assessment of existing motorway bridge, L. D'Angelo, A. Nussbaumer, M.A. Fenart, A.G. Dumont

12:15: Comparing two types of fatigue and tsunami resisting medium span bridges, P. Van Bogaert

12:30: Assessment of bridge behaviour due to the passage of high speed trains, A. Graca, L. Guerreiro, F. Virtuoso

Session T2C: Special Session: Bridge Girders & Bridge Engineering II

Organisers: Dr. R. Vieira & Prof. F. Virtuoso, Instituto Superior Tecnico, Portugal

Chair: Prof. P. Van Bogaert, Univ. of Ghent, Belgium

13:30: Considerations on the long-term behaviour of composite steel-concrete bridges, G. Ranzi, G. Leoni, L. Dezi, R. Zandonini

13:45: Are short span reinforced concrete bridge girders cost effective, T.N. Haas, D. Smith

14:00: Effect of constraint in-plane displacement conditions for the unloaded edges of stiffened flanges used in steel box girder bridges, P.S. Ferreira, F. Virtuoso

14:15: Buckling resistance with combined shear of steel curved bridge girder webs, P. Van Bogaert

14:30: The weathering steel bridges maintenance practice in Poland, M. Lagoda, T. Wierzbicki

14:45: Study on high speed railway prestressed continuous rigid frame bridges, J.Q. Lei, K. Zhang

15:00: Experimental study on hybrid FRP-concrete bridge superstructure, Y.L. Wang, J.H. Ran, Y.Y. Li, M.M. Cao

Session T3C: Lightweight Structures & Roof Systems

Chair: Prof. T.J. Ibell, Univ. of Bath, UK

15:30: Extraordinary possibilities using fabric to form concrete structures, J.J. Orr, T.J. Ibell, A.P. Darby, M. Evernden (Invited Paper)

16:00: The Porsche Pavilion in the Autostadt Wolfsburg, Germany, H. Pasternak, T. Krausche (Invited Paper)

16:30: Computational model for simulation of rigid foldable origami structures, J.D. van der Woerd, R. Chudoba, J. Hegger

16:45: Performance analysis of a membrane roof project, E.F. Nunes, J.B.M. de Sousa Jr, B. Baier, A.M.S. de Freitas

17:00: Collapse behaviour of double-layer grid structures in steel, J.M. Adams, A. Zingoni

Session W1C: Cables, Bars, Rods & Struts

Chair: Prof. V. Denoel, Univ. of Liege, Belgium

10:30: Design of tension components according to Eurocode 3 Part 1-11, K. Kathage (Invited Paper)

11:00: Behaviour of composite bar structures: Theory and examples, J.B. Obrebski (Invited Paper)

11:30: A method for reconstructing the shape of highly flexible slender objects from distributed strain measurements, M.D. Todd, C.J. Stull, M. Dickerson

11:45: Rod-in-tube buckling: Comparative analysis of numerical and test results, V.S. Tikhonov, O.S. Bukashkina

12:00: On load drop phenomenon in axially compressed elasto-plastic columns, L. Kwasniewski

12:15: Eulerian formulation for an extensible elastic rod, A. Huynen, E. Detournay, V. Denoel

12:30: Some results of experimental investigations of thin-walled bars, J.B. Obrebski

Session W2C: Soil-Structure Interaction, Foundations & Geotechnical Engineering I

Chair: Prof. L.V. Andersen, Univ. of Aalborg, Denmark

13:30: The second order solution of Boussinesq's problem, E. Ferretti

- 13:45:** Upper and lower bound calculations of the bearing capacity of strip footings near slopes in cohesionless soil, S. Krabbenhoft, K. Krabbenhoft, L. Damkilde
- 14:00:** Stress state of massive foundation slabs: Measurements and simulation, K. Stopp
- 14:15:** Soil-structure interaction: Analysis through measurements, F. Kopf, D. Schaefer, J. Pistrol
- 14:30:** Numerical calculation of damping for monopile foundations under cyclic load during steady-state vibration, M. Bayat, L.V. Andersen, S.M. Andersen, L.B. Ibsen
- 14:45:** Improved subgrade reaction model in designing embedded piles exposed to static lateral head loads, M. Pulsfort, T. Welskopf

Session W3C: Soil-Structure Interaction, Foundations & Geotechnical Engineering II

Chair: Prof. M. Pulsfort, Bergische Univ. of Wuppertal, Germany

- 15:30:** Field test of soil-steel arch with ribs and calculation of internal forces on the basis of measured strains, B. Kunecki, L. Korusiewicz
- 15:45:** Alternative shape of suction caisson to reduce risk of buckling under high pressure, S. Madsen, L.V. Andersen, L.B. Ibsen
- 16:00:** Qualitative and quantitative assessment of liquefaction in a saturated road embankment, A. Borowiec, K. Maciejewski
- 16:15:** A study of frictional interface properties between typical South African sands and construction materials, Z. Bhengu, D. Kalumba, F.C. Chebet
- 16:30:** Dynamic soil-structure interaction behaviour of building frames with raft foundation, G. Narayana, H. Sharada Bai, M.P. Jyothi
- 16:45:** Using the shear strength reduction method to assess the stability of retaining structures adjacent to excavations, C.J. Warren-Codrington, D. Kalumba

Stream D: Room LS2B

Session M1D: Special Session: Steel Structures: Stability, Strength & Design I. Organisers: Prof. D. Camotim, Technical Univ. of Lisbon, Portugal & Dr. C. Basaglia, Univ. of Saulo Paulo, Brazil
Co-Chairs: Prof. D. Camotim, Technical Univ. of Lisbon, Portugal & Dr. C. Basaglia, Univ. of Saulo Paulo, Brazil

- 10:30:** Stability, failure and design of I-section steel beams subjected to tension, J. Tomas, J. Nseir, D. Camotim, N. Boissonnade
- 10:45:** Behaviour of I-section columns experiencing local-global mode interaction: Analytical and finite element modelling, M.A. Wadee, L. Bai, D. Camotim, C. Basaglia
- 11:00:** Stabilization of members with I-sections against flexural torsional buckling, R. Stroetmann
- 11:15:** Nonlinear finite element modelling of castellated steel beams lateral torsional buckling, F.O.M. da Gama, L.R.O. Lima, J.G.S. Silva, P.C.G.S. Vellasco, M.M.B.R. Vellasco
- 11:30:** Verifying the stability of steel beam-column with intermediate elastic restraint with an approach of direct method, I. Misiunaite, A. Juozapaitis
- 11:45:** Influence of the cross section slenderness on the buckling behaviour of steel welded tapered beam-column, I.M. Cristutiu, D.L. Nunes
- 12:00:** Buckling mode decomposition of thin-walled members with holes, M. Nedelcu, N. Chira, H.L. Cucu, A.G. Popa
- 12:15:** Lateral-distortional buckling formulae for hollow tubular flange plate girders with slender unstiffened webs, M.F. Hassanein, N. Silvestre

Session M2D: Special Session: Steel Structures: Stability, Strength & Design II. Organisers: Prof. D. Camotim, Technical Univ. of Lisbon, Portugal & Dr. C. Basaglia, Univ. of Saulo Paulo, Brazil
Co-Chairs: Prof. P. Vellasco, State Univ. of Rio De Janeiro, Brazil & Dr. M.A. Wadee, Imperial College London, UK

- 13:30:** Design by inelastic analysis: 2010 AISC specification, R.D. Ziemian

- 13:45:** A new design methodology for steel hollow sections: The Overall Interaction Concept, J. Nseir, E. Saloumi, N. Boissonnade
- 14:00:** Use of the Overall Interaction Concept for the practical design of steel sections and members, N. Boissonnade, J. Nseir, E. Saloumi
- 14:15:** Extension of the DSM to welded H profile cross-sections, B. Rossi, Y. Li
- 14:30:** Influence of cross-section geometry on the distortional post-buckling strength of cold-formed steel columns, A. Landesmann, D. Camotim, C. Basaglia
- 14:45:** Tests of cold-formed steel lipped channel columns undergoing local-distortional-global interaction, B. Young, D. Camotim, P.B. Dinis

**Session M3D: Special Session: Steel Structures: Stability, Strength & Design III. Organisers: Prof. D. Camotim, Technical Univ. of Lisbon, Portugal & Dr. C. Basaglia, Univ. of Saulo Paulo, Brazil
Co-Chairs: Prof. R.D. Ziemian, Univ. of Bucknell, USA & Prof. L. Gardner, Imperial College London, UK**

- 15:30:** On the strength of T-section columns, F. Sena Cardoso, K.J.R. Rasmussen
- 15:45:** Resistance assessment of the sinusoidal openings in cellular beams, S. Durif, A. Bouchair
- 16:00:** Generalised beam theory (GBT) for stiffened sections, G. Taig, G. Ranzi, G. Piccardo, A. Luongo
- 16:15:** GBT buckling analysis of I-section steel girders under concentrated loads, P. Natario, N. Silvestre, D. Camotim
- 16:30:** Inelastic post-buckling GBT analysis of tubular thin-walled metal members, M. Abambres, D. Camotim, N. Silvestre
- 16:45:** Local and global vibration analysis of thin-walled steel frames using Generalised Beam Theory (GBT), C. Basaglia, D. Camotim, H.B. Coda

**Session T1D: Special Session: Steel Structures: Stability, Strength & Design IV. Organisers: Prof. D. Camotim, Technical Univ. of Lisbon, Portugal & Dr. C. Basaglia, Univ. of Saulo Paulo, Brazil
Co-Chairs: Prof. B. Young, Univ. of Hong Kong, China & Prof. N. Boissonnade, Univ. of Applied Sciences of Western Switzerland, Switzerland**

- 10:30:** Experimental and numerical research on longitudinally stiffened tapered steel plate girders subjected to shear, A. Bedynek, E. Mirambell, E. Real
- 10:45:** Moment redistribution in cold-formed steel continuous beams, C. Hui, L. Gardner, D.A. Nethercot
- 11:00:** Modelling of force-deformation characteristic of angle bracing members, M.A. Gizejowski, A.M. Barszcz
- 11:15:** Three-dimensional joist member design using equivalent beam theory, S.J. Kilber, A.E. Surovek
- 11:30:** Influence of imperfections and geometrical discontinuities on the behaviour of steel towers, A.I. Dogariu, D. Dubina
- 11:45:** Analysing portal frames using rotational springs, T.N. Haas, H.L. Albertyn, P.E. Dunaiski
- 12:00:** Behaviour of pitched-roof portal frames with tapered web and flange members considering lateral restraints, I.M. Cristutiu, D.L. Nunes
- 12:15:** Effect of serviceability limits on optimal design of steel portal frames, T.D. Phan, J.H. Lim, J.B.P. Lim, W. Sha, T.T. Tanyimboh, M. Dundu
- 12:30:** Nonplanar vibration and dynamic instability of slender cruciform columns, E.C. Carvalho, P.B. Goncalves, Z.J.G.N. Del Prado, G. Rega

**Session T2D: Special Session: Steel Structures: Stability, Strength & Design V. Organisers: Prof. D. Camotim, Technical Univ. of Lisbon, Portugal & Dr. C. Basaglia, Univ. of Saulo Paulo, Brazil
Co-Chairs: Prof. D. Dubina, Univ. of Timisoara, Romania & Prof. N. Silvestre, Technical Univ. of Lisbon, Portugal**

- 13:30:** Continuous beam tests on aluminium alloy SHS and RHS with internal stiffeners, M. Su, B. Young, L. Gardner
- 13:45:** Coupled instability behaviour of members with thin-walled welded box sections loaded in

bending and compression, A. Taras, H. Unterweger, S. Hafner

14:00: Post-buckling behaviour and strength of cold-formed steel lipped channel columns: When is local-distortional interaction relevant? P.B. Dinis, D. Camotim, A.D. Martins

14:15: A semi-discretized thin-walled beam element including distortion, M.J. Andreassen, J. Jonsson

14:30: A linear one-dimensional model for the flexural-torsional vibrations of tapered thin-walled bars with open cross-sections, A. Andrade, P. Providencia, D. Camotim

14:45: Design of Z-section purlins under combined axial compression and bending, J. Becque, K.J.R. Rasmussen

Session T3D: Special Session: Cold-Formed Steel Structures I

Organiser: Prof. K. Rasmussen, Univ. of Sydney, Australia

Chair: Prof. K. Rasmussen, Univ. of Sydney, Australia

15:30: Cold-formed steel design and research assisted by testing, D. Dubina (Invited Paper)

16:00: Performance of reinforced web openings of cold-formed steel joists, K.S. Sivakumaran

16:15: On the response of cold-formed steel sections under compression, N. Baldassino, G. Torresani, R. Zandonini, G. Manzini, F. Scavazza

16:30: Shear design of cold-formed steel beams using direct strength method, P. Keerthan, M. Mahendran

16:45: Compressive resistance of circular hollow sections with squashed ends, M. Dundu, J. Tumkou

17:00: Shear strengths of lipped channel beams with stiffened web openings using numerical studies, P. Keerthan, M. Mahendran

Session W1D: Special Session: Cold-Formed Steel Structures II

Organiser: Prof. K. Rasmussen, Univ. of Sydney, Australia

Chair: Prof. L. Gardner, Imperial College London, UK

10:30: Analysis and design of perforated cold-formed steel members in compression, Z. Yao, K.J.R. Rasmussen (Invited Paper)

11:00: Design models for the bolted joints of cold-formed steel pitched roof portal frames, D. Dubina, V. Ungureanu, P. Pernes

11:15: Rational DSM design of thin-walled cruciform and angle columns, P.B. Dinis, D. Camotim

11:30: Single shear screwed connection tests of thin sheet steel at elevated temperatures, S. Yan, B. Young

11:45: The influence of pallets on the behaviour and design of drive-in steel storage racks: Part I: Behaviour, B.P. Gilbert, L.H. Teh, R.X. Badet, K.J.R. Rasmussen

12:00: The influence of pallets on the behaviour and design of drive-in steel storage racks: Part II: Design, B.P. Gilbert, L.H. Teh, R.X. Badet, K.J.R. Rasmussen

12:15: Cold-formed steel beams of corrugated web, D. Dubina, V. Ungureanu, L. Gilia

12:30: Buckling of cold-formed lipped-channel stub columns, M. Dundu, J. Lim

Session W2D: Special Session: Stainless Steel Structures I

Organiser: Prof. K. Rasmussen, Univ. of Sydney, Australia

Chair: Prof. B. Young, Univ. of Hong Kong, China

13:30: Constitutive equations for stainless steels: Experimental tests and new proposal, I. Arrayago, E. Real, E. Mirambell

13:45: Direct strength method and continuous strength method for cold-formed lean duplex stainless steel columns, Y. Huang, B. Young

14:00: Numerical study of lean duplex stainless steel plate girders with stocky flanges and slender unstiffened webs under bending, M.F. Hassanein, N. Silvestre

14:15: Structural response of stainless steel cross-sections under combined compression and biaxial bending, M. Theofanous, L. Gardner, E. Koltsakis

14:30: Investigating the role of gradual yielding in stainless steel columns and beams by virtual testing, P. Hradil, A. Talja

14:45: Experiments on ferritic stainless steel columns in fire, B. Rossi, N. Tondini, J.M. Franssen

Session W3D: Special Session: Stainless Steel Structures II
Organiser: Prof. K. Rasmussen, Univ. of Sydney, Australia
Chair: Prof. E. Real, Universitat Politecnica de Catalunya, Spain

15:30: Buckling response of ferritic stainless steel columns at elevated temperatures, S. Afshan, L. Gardner, N.R. Baddoo

15:45: Interaction effects of constituent plate elements on cold-formed high strength stainless steel cross-section behaviour in compression, F. Zhou, Y. Chen, B. Young

16:00: Mechanical properties of austenitic stainless steel after exposure to fire, X.Q. Wang, Z. Tao, T.Y. Song, L.H. Han

16:15: Study on ferritic stainless steel and its application on architecture structure, M. Li, W. Dong

Stream E: Room LS2C

Session M1E: Concrete Structures & Concrete Design I

Co-Chairs: Prof. J.A. Overli, Norwegian Univ. of Science & Technology, Norway
& Prof. J.V. Retief, Univ. of Stellenbosch, South Africa

10:30: Dismantleable joints of load-bearing reinforced concrete units of prefabricated concrete building system with controlled stiffness, J. Witzany, T. Cejka, R. Zigler (Invited Paper)

11:00: Assessing the reliability of existing concrete bridges in terms of shear strength, D. Busse, L. Eckfeldt, M. Empelmann

11:15: Numerical investigations on the shear capacity of reinforced concrete slabs under concentrated loads, K. Reissen, J. Hegger

11:30: Analysis of the structural behaviour of shear-critical prestressed and reinforced concrete beams using digital image correlation, K. De Wilder, P. Lava, G. De Roeck, L. Vandewalle, D. Debruyne, Y. Wang

11:45: The effect of steel fibres on the compressive ductility in lightweight aggregate concrete structures, J.A. Overli, T.M. Jensen

12:00: Full-range behaviour of FRP-to-concrete bonded joints with trilinear bond-slip law, H. Yuan, L. Wu

Session M2E: Concrete Structures & Concrete Design II

Chair: Prof. J. Witzany, Czech Technical Univ. in Prague, Czech Republic

13:30: A comparison of the variable strut inclination and alternative stirrup design methods, K.K. Mensah, C. Barnardo-Viljoen, J.V. Retief

13:45: Shear strength of reinforced concrete plastic hinges subjected to seismic action, R.V. Mehrabani, V. Sigrist

14:00: Experimental and numerical investigations on punching behaviour of thick footings with and without shear reinforcement, D. Kueres, C. Siburg, J. Hegger, K. Reissen

14:15: Reliability of EN1992 crack model applied to South African water retaining structures, C.H. McLeod, J.V. Retief, J.A. Wium

14:30: New design approach for crack width calculation in reinforced concrete structures, H.A. Elgohary, M.M. Assas

Session M3E: Durability, Creep, Shrinkage & Transport Processes in Concrete

Chair: Prof. J. Wium, Univ. of Stellenbosch, South Africa

15:30: The origin of plastic settlement cracking and the effect of re-vibration, R. Combrinck, W.P. Boshoff

15:45: Chimney cracked reinforced concrete walls as a problem of durability exploitation, M. Kaminski, M. Maj, A. Ubysz

16:00: Water transport in surface layer of fair-face concrete, P. Reiterman, F. Vogel, O. Holcapek,

K. Kolar, P. Konvalinka, M. Keppert, M. Cachova, E. Vejmelkova

16:15: Composite material under influence of moisture, J. Skramlik, M. Novotny, K. Suhajda

16:30: Creep influence on concrete slabs prestressed in both directions, G. Sossou

16:45: Frost resistance property of concrete doped with scrap rubber powder, B.M. Wang, Y. Han, S. Liu

Session T1E: Fibre-Reinforced Concrete, Polymer-Reinforced Concrete & Cement Composites

Chair: Prof. N. Banthia, Univ. of British Columbia, Canada

10:30: Multi-functional fibre reinforced concrete for sustainable structures, N. Banthia (Invited Paper)

11:00: Comparison of strain measurement techniques for the characterization of brittle, cementitious matrix composites, D. Arboleda, S. Yuan, J. Giancaspro, A. Nanni

11:15: Strut and tie models for disturbed regions: Steel fibre reinforced concrete dapped end beams, J.M. Hisdal, G. Zirgulis, E.V. Sarmiento, T. Kanstad

11:30: A review of the shear behaviour of reinforced steel fibre concrete, S. Zeranka, G.P.A.G. van Zijl

11:45: Time-dependent behaviour of pre-cracked polypropylene fibre reinforced concrete (PFRC) under sustained loading, A.J. Babafemi, W.P. Bishoff

12:00: Effect of temperature on the behaviour of polymer reinforced concrete façade, J.O. Akinyele

12:15: Study of the properties of hybrid fibre reinforced concretes, T. Zych

Session T2E: Special Session: High Performance Concrete I

Organiser: Prof. E. Fehling, Univ. of Kassel, Germany

Chair: Prof. B. Middendorf, Univ. of Kassel, Germany

13:30: UHPC: A challenging material for innovative structures, E. Fehling (Invited Paper)

14:00: Modular constructions made of UHPC, N.V. Tue, M. Reichel

14:15: Development of ultra-high performance concrete and applications to bridges in Korea, C. Joh, S.Y. Park, K.T. Koh, S.W. Kim, Y.J. Kim, B.S. Kim

14:30: Behaviour of hybrid PVA-steel fibre reinforced ultra high performance concrete at high temperature, S. Sanchayan, S.J. Foster

14:45: Sustainable building with ultra-high performance concrete (UHPC): Coordinated research program in Germany, M. Schmidt

Session T3E: Special Session: High Performance Concrete II

Organiser: Prof. E. Fehling, Univ. of Kassel, Germany

Chair: Prof. E. Fehling, Univ. of Kassel, Germany

15:30: Composite structures of steel and filigree UHPC elements: Experimental and numerical investigations, T. Lechner, O. Fischer, G. Seidl

15:45: Optimisation process for thin-walled high performance concrete sandwich panels, K. Hodicky, T. Hulin, J.W. Schmidt, H. Stang

16:00: Quality control of UHPC by using non-destructive ultrasonic testing methods, B. Middendorf, A. Glaubitt

16:15: Statistical model for compressive strength prediction of high-performance concrete, A. Kapelko, M. Kapelko, R. Kapelko

16:30: Experimental tests and analytical modeling of UHPC beams subjected to torsion, E. Fehling, M. Ismail, T. Leutbecher

16:45: Compressive strength of high-performance concrete with absorption capacity of super-absorbing-polymers (SAP), B.J. Olawuyi, W.P. Boshoff

Session W1E: Special Session: High Performance Concrete III

Organiser: Prof. E. Fehling, Univ. of Kassel, Germany

Chair: Prof. N.V. Tue, Graz Univ. of Technology, Austria

10:30: A model for spalling of HPC thin plates exposed to fire, T. Hulin, K. Hodicky, J.W. Schmidt, J.H. Nielsen, H. Stang

- 10:45:** Micro structural optimization of high strength performance air hardened foam concrete, B. Middendorf, A. Just
- 11:00:** The anchorage of rebars in UHPC, P. Lorenz, E. Fehling
- 11:15:** Next generation nano-based carbon concrete, P.S. Nagaraja, F.A. Khan, K.N.N. Gowda, S.A.K. Zai, H.R. Srinivas
- 11:30:** Evaluation of behaviour and ductility of polymer modified steel fibre reinforced high performance concrete beams, S.A.K. Zai, N. Munirudrappa, K. Muthumani, R. Naveen, H.R. Srinivas
- 11:45:** Structural behaviour of high performance fibre-reinforced flowable concrete beams and plates, S.G. Ladkany, A.T. Berhe
- 12:00:** Influence of fibre orientation on the properties of strain hardening ultra high performance fibre reinforced concrete (UHPFRC) under direct tensile loading, C. Hollmann, K. Wille

Session W2E: Construction Materials, Construction Technology, Building Performance I

Chair: Dr. S.A.K. Zai, Univ. of Bangalore, India

- 13:30:** Determination of the relation between the content of used reclaimed asphalt material and deformation characteristics of asphalt concretes, K. Milackova, P. Mondschein, J. Valentin
- 13:45:** Feasibility of lightweight aggregate concrete for structural and non-structural works in Tanzania, A.L. Mrema, H.A. Mboya
- 14:00:** Mechanical properties of aluminous cement paste at high temperature, O. Holcapek, P. Reiterman, F. Vogel, E. Vejmelkova, P. Konvalinka
- 14:15:** The influence of percentage replacement from coarse recycled concrete aggregate, D.W. Immelman, W. de Villiers
- 14:30:** Full-scale model of road structure, M. Varaus, P. Hyzl, D. Stehlik
- 14:45:** Monitoring of experimental sections with recycled waste materials, D. Stehlik, M. Varaus, P. Hyzl

Session W3E: Construction Materials, Construction Technology, Building Performance II

Chair: Prof. A.L. Mrema, Univ. of Dar es Salaam, Tanzania

- 15:30:** Experience with experimental designs and performance assessment of cold asphalt mixtures: New type of pavement structure in the Czech Republic, J. Suda, J. Valentin, J. Zak, J. Sedina, K. Milackova
- 15:45:** Knowledge sharing and constructability in structural design, V. Kuo, J. Wium
- 16:00:** Processes of ID-based linking of structural relevant construction phase data to planning phase data using auto-ID techniques, L. Laussat, A. Kelm, A. Meins-Becker, M. Helmus
- 16:15:** Verification of MZELWE module in ESP-r programme with experimental confrontation, A.M. Cekon, M. Kalousek, B.J. Hraska
- 16:30:** Thermal comfort of the rooms in the designing of commercial buildings, K. Nowak, K. Nowak-Dziesko, M. Rojewska-Warchal

Stream F: Room LS1C

Session M1F: Performance of Structures in Fire & Design for Fire Resistance I

Chair: Prof. M. Fontana, ETH Zurich, Switzerland

- 10:30:** Structures in fire or fires in structures? Assessing the true performance of structures in fire, J.L. Torero (Invited Paper)
- 11:00:** Shear capacity of steel plate girders with slender webs in fire, T. Ohtsuka, M. Knobloch, M. Fontana
- 11:15:** Modelling and assessment of the response of super-light elements to fire, K.D. Hertz, B.M. Campeanu, M. Giraud, L. Giuliani
- 11:30:** Composite floors with steel fibre reinforced concrete slabs exposed to fire, J. Bednar, F. Wald, J. Vodicka, A. Kohoutkova
- 11:45:** Engineering solutions for structures in fire: Should concrete care, L.A. Bisby
- 12:00:** Structural analysis at the fire limit state: Practical applications, A. Jowsey, P. Scott

12:15: Numerical study of travelling fire in full-scale experimental building, K. Horova, F. Wald

Session M2F: Performance of Structures in Fire & Design for Fire Resistance II

Chair: Prof. J.L. Torero, Univ. of Queensland, Australia

13:30: Global structural behaviour in fire and consolidated testing of steel structures, M. Fontana, M. Knobloch, A. Frangi (Invited Paper)

14:00: The application of fire engineering methods for the design of open steel car parks, G. Wozniak, R. Obiala

14:15: Numerical study on structural behaviour of cold-formed steel columns under fire conditions, S.J.C. Almeida, J.M. Neto, J.P.C. Rodrigues

14:30: An analytical method for determining the loading on connections in heating and cooling during a fire, D. Lange, J. Albrektsson

14:45: Fire protection of multi-storey straw bale buildings, J. Wachtling, D. Hosser, J. Zehfuss

Session M3F: Performance of Structures in Fire & Design for Fire Resistance III

Chair: Dr. L. Giuliani, Technical Univ. of Denmark, Denmark

15:30: Numerical simulation of thin RC structures exposed to fire, R. Harte (Invited Paper)

16:00: Fire design of wooden box floors, D. Dhima, R. Blondeau-Patissier

16:15: No-sway collapse of steel frames under fire conditions: A parametric investigation, A. Monti, T. Pariciani, F. Gentili, F. Petrini

16:30: Numerical studies of load bearing LSF walls under realistic design fire conditions, P. Keerthan, A. Ariyanayagam, M. Mahendran

16:45: Development of a simplified design method to predict the fire rating of LSF walls, S. Gunalan, M. Mahendran

Session T1F: Structural Safety, Structural Reliability & Risk Assessment

Chair: Prof. M. Holicky, Czech Technical Univ. in Prague, Czech Republic

10:30: Target reliability for engineering structures, M. Holicky (Invited Paper)

11:00: Reliability evaluation and design of steel frames with BRBs under severe earthquakes, Y.S. Liu, G.Q. Li, X.K. Guo

11:15: Reliability analysis of corroding pipelines by enhanced Monte Carlo simulation, B.J. Leira, A. Naess, O.E. Brandrud Naess

11:30: Some practical aspects of statistics methods of estimation reliability computed for existing silo constructions, M. Kaminski, M. Maj

11:45: Model uncertainties in reliability analysis of reinforced concrete structures, M. Holicky, M. Sykora, C. Barnardo-Viljoen, K.K. Mensah, J.V. Retief

12:00: Safety in design for industrial and mining structures, T. Langbecker, S. Loganathan

12:15: Risk-based design in mining structures, M. Mmusi, A. Masarira

12:30: Simulated virtual portfolio for masonry buildings, A. Muehlhausen, U.E. Dorka, F. Obon Santacana, A. Smolka, M. Stupazzini

Session T2F: Performance of Structures in Fire & Design for Fire Resistance IV

Chair: Prof. L. Bisby, Univ. of Edinburgh, UK

13:30: Fire resistance assessment of steel structure exposed to fire for differentiated safety requirements, M. Maslak

13:45: Numerical experimental design approach to evaluate the fire resistance of timber connections, M. Audebert, D. Dhima, A. Bouchair

14:00: Performance of reinforced concrete structures in post-earthquake fire, B. Behnam, H. Ronagh, M. Ashraf

14:15: Behaviour of structural steel subjected to post-earthquake fire, S. Sinaie, A. Heidarpour, X-L. Zhao

14:30: Numerical and experimental investigation of the toxicity and light extinction of fire smoke using experimental data from fire tests of polymers, A. Loehnert, N. Monreal, C. Knaust, U. Krause

Session T3F: Structural Optimisation

Chair: Prof. G. Rozvany, Budapest Univ. of Technology and Economics, Hungary

15:30: Effective lightweight design of a rocket interstage ring through mixed-integer optimization, H. Koeke, L. Weiss, C. Huehne

15:45: Topology optimization with local stress constraints in a simultaneous analysis and design setting, D.P. Munro, A.A. Groenwold

16:00: Reliability-based robust optimization using variance based methods, G. Karaki

16:15: Designing adaptive structures for whole life energy savings, G. Senatore, P. Duffour, S. Hanna, P. Winslow, C. Wise

16:30: Softening some effects of the no-free-lunch (NFL) theorems in optimization via parallel computing, S.S. van Huyssteen, A.A. Groenwold

16:45: Exploring the domain of application of adaptive structures, G. Senatore, P. Duffour, P. Winslow, S. Hanna, C. Wise

Session W1F: Masonry Structures

Chair: Prof. E. Erdogmus, Univ. of Nebraska-Lincoln, USA

10:30: In situ full-scale tests for old masonry elements: The out-of-plane response, A. Borri, M. Candela, R. Fonti

10:45: Seismic behaviour of masonry walls with soft-layer wall bearings, N. Mojsilovic, B. Stojadinovic, A. Barandun, C. Vogeli

11:00: Structural design for earth buildings, A.C. Heath, P.J. Walker

11:15: Application of sequentially linear analysis to the seismic assessment of slender masonry towers, V. Mariani, A.T. Slobbe, M.A.N. Hendriks, J.G. Rots

11:30: Experimental evaluation of the response of ferrocement strengthened lightweight masonry walls to impact loads, M.A.N. Abdel-Mooty

11:45: Externally applied retrofit system for existing masonry buildings subject to progressive collapse, A. Kousgaard, E. Erdogmus

12:00: Non-linear static analysis of masonry-infilled RC frames, A. Kocak, B. Doran, A. Kalyoncuoglu, B. Zengin

12:15: Sisal reinforced cement-based masonry units, G. Coetzee, W.P. Boshoff, R.D. Toledo Filho

12:30: Affordable, sustainable and resilient tornado shelter design using compressed stabilized earth block construction, B. Wagner, E. Erdogmus, A. Schwer

Session W2F: Timber Structures

Chair: Dr. G. Faller, Arup, Spain

13:30: Behaviour of steel to timber connections in fire and normal conditions, A. Bouchair, D. Dhima, P. Racher (Invited Paper)

14:00: Shaking table tests on a large-scale moment resistant timber frame with post-tensioning and energy dissipating system, F.C. Ponzo, A. Di Cesare, M. Simonetti, D. Nigro, T. Smith, S. Pampanin

14:15: Fracture process under moisture content variation in timber structures, R.M. Pitti, F. Dubois, E. Fournely, B. Mbangagoye

14:30: The resilience of timber buildings, G. Faller

14:45: Numerical modelling of a post-tensioned timber frame building with hysteretic energy dissipation, A. Di Cesare, F.C. Ponzo, M. Simonetti, T. Smith, S. Pampanin

Stream G: Room LS1D

Session M1G: Special Session: Structural Health Monitoring & Damage Detection I

Organiser: Prof. G. De Roeck, Univ. of Leuven, Belgium

Chair: Prof. B. Hillemeier, Technical Univ. Berlin, Germany

10:30: Making sense of bridge monitoring: Vision for the future, A. Pavic, J.M.W. Brownjohn
(Invited Paper)

11:00: Structural model updating using combined global mode and local primary frequency, J.L. Hou, J.P. Ou, L. Jankowski

11:15: A novel two-step method for localization and assessment of cracks in beams, G.R. Gillich, Z.I. Praisach

11:30: Model updating of strategic building structures under real earthquake loading, R. Ceravolo, A. De Stefano, E. Matta, A. Quattrone, L. Zanotti Fragonara

11:45: A frequency analysis applied to force identification, M. Thiene, U. Galvanetto, M. Ghajari, M.H. Aliabadi

12:00: Influence of multiple cracks upon the dynamic behaviour of beams, Z.I. Praisach, G.R. Gillich

12:15: Structural health monitoring of continuously welded underground pipelines based on quasi-distributed wireless inclinometers, S. Li, M. Zhao, N. Gao

Session M2G: Special Session: Structural Health Monitoring & Damage Detection II

Organiser: Prof. G. De Roeck, Univ. of Leuven, Belgium

Chair: Prof. G. De Roeck, Univ. of Leuven, Belgium

13:30: Advances and challenges in structural health monitoring, G. De Roeck, E. Reynders
(Invited Paper)

14:00: A damage evaluation method for bridge substructures using longitudinal impact dynamic responses, J.W. Zhan, H. Xia, N. Zhang

14:15: Structural damage identification in small scale models of bridge decks, R. Carrazedo, T.M. Juliani

14:30: An application of the local flexibility method to hyper-static beams using non-local virtual forces, T.Y. Hsu, S.Y. Shiao, W.I. Liao, C.H. Loh

14:45: On the application of artificial boundary condition frequencies in structural identification, Y. Lu, L. Mao, Z.G. Tu (Invited Paper)

Session M3G: Special Session: Structural Health Monitoring & Damage Detection III

Organiser: Prof. G. De Roeck, Univ. of Leuven, Belgium

Chair: Prof. G. De Roeck, Univ. of Leuven, Belgium

15:30: A system model for lifecycle monitoring of bridges, M. Wild, O. Fischer, G. Dori, A. Borrmann

15:45: The opportunities of blind source separation techniques in the automation of modal identification for vibration based SHM, C. Rainieri, G. Fabbrocino

16:00: Application of SHM system based on modal filtration to the truss structure, K. Mendrok, T. Uhl, W. Maj

16:15: System identification of masonry buildings in Vienna, F. Kopf, D. Schaefer, M. Pietsch, H. Wenzel

16:30: Shear wave travel times in multi-storey buildings for system identification and damage detection, E. Safak, E. Cakti, E. Zengin

16:45: Structural health monitoring of the Basilica S. Maria di Collemaggio, V. Gattulli, F. Graziosi, F. Federici, F. Potenza, A. Colarieti, M. Lepidi

Session T1G: Special Session: Non-Destructive Evaluation

Organiser: Prof. A. Ghorbanpoor, Univ. of Wisconsin-Milwaukee, USA

Chair: Prof. A. Ghorbanpoor, Univ. of Wisconsin-Milwaukee, USA

10:30: Non-destructive evaluation (NDE) practice for concrete bridges in USA, A. Ghorbanpoor, S. Boone (Invited Paper)

- 11:00:** Rapid and economical condition assessment of concrete bridge decks through automation of NDE data collection, analysis and interpretation, N. Gucunski, A. Maher, H. Ghasemi, F.S. Ibrahim
- 11:15:** Automated devices for inspection and maintenance, E. Kuhn, C. Zimmermann
- 11:30:** Detection of damage due to salt crystallization through the scaling subtraction method, P. Antonaci, P.G. Bocca, A.S. Gliozzi, M. Scalerandi
- 11:45:** Application and developments of the infrared thermography in the building construction sector, S. Knapp, B. Hillemeier
- 12:00:** Transducer frequency influence on ultrasonic velocity measurements in concrete specimens, G. Concu, B. De Nicolo, N. Trulli, M. Valdes
- 12:15:** Cable break detection in prestressed bridges, parking decks and girders, B. Hillemeier, S. Knapp

Session T2G: Special Session: Structural Health Monitoring & Damage Detection IV

Organiser: Prof. G. De Roeck, Univ. of Leuven, Belgium

Chair: Prof. G. Fabbrocino, Univ. of Molise, Italy

- 13:30:** Experimental study on bridge damage identification based on wavelet packet energy curvature difference method, Z. Yu, H. Xia, J. Zhan
- 13:45:** Damage detection on reinforced concrete framed structures using a band-variable filter, F.C. Ponzio, R. Ditommaso, G. Auletta, A. De Muro
- 14:00:** Damage identification in the mistuned bladed system utilizing the outlier analysis, A.U. Rehman, F.H. Shah, K. Worden, J.A. Rongong
- 14:15:** Modal characteristics-based damage identification in repeating structures, A.U. Rehman, F.H. Shah, C.E. Lord, A. Javed, S. Nazar
- 14:30:** Research on corrosion monitoring for steel-reinforced concrete structures using fibre optic sensing technique, X.F. Zhao, L. Wang, Q. Liu, S.J. Shan, H. Dong, Y.F. Zhu, Y.H. Jiang, Y. Yu
- 14:45:** Steel reinforced concrete structures dynamic damage monitoring using guided wave testing technique, D.S. Li, J.H. Yuan, W. Yang, W.Y. Zhang

Session T3G: Structural Assessment, Damage Assessment & Disaster Management

Chair: Prof. E. Safak, Kandilli Observatory & Earthquake Research Institute, Turkey

- 15:30:** Structural assessment during the demolition of an arch bridge by advanced modal techniques, K. Islami, R. Betti
- 15:45:** Capacity assessment of damaged school buildings after 2011 Van earthquake, R.A. Oyguc
- 16:00:** Approaches to quantify the safety gain for existing concrete bridges due to surveillance, C. Siegert, L. Eckfeldt, M. Empelmann
- 16:15:** EQvis: A consequence based risk management software tool, D. Schaefer, M. Pietsch, H. Wenzel
- 16:30:** Measuring degree of interdependencies at the infrastructure level during emergencies, D. Solari, G.P. Cimellaro, A.M. Reinhorn
- 16:45:** FE models for evaluating damages in churches hit by L'Aquila earthquake, G. Brando, E. Criber, G. De Matteis

Session W1G: Special Session: Failure Analysis & Forensic Structural Engineering

Organisers: Dr. S. Arangio & Dr. C. Crosti, Sapienza Univ. of Rome, Italy

Co-Chairs: Dr. C. Crosti, Sapienza Univ. of Rome, Italy & Dr. L. Giuliani, Technical Univ. of Denmark, Denmark

- 10:30:** Lessons for structural engineers: The Hillsborough disaster, R.A. Smith (Invited Paper)
- 11:00:** The art of the forensic engineer, D. Charrett
- 11:15:** Causal models for the forensic investigation of structural failures, S. Arangio, C. Crosti, F. Bontempi
- 11:30:** Effect of load redistribution of a steel truss bridge due to fracture of a truss member on vibration-based fault detection, C.W. Kim, S. Kitauchi, K. Hashimoto, K. Sugiura, M. Kawatani

- 11:45:** Structural failures and monitoring of structural health with use of WiSeNe MONIT system, S. Wierzbicki, M.A. Gizejowski, Z. Stachura
- 12:00:** An investigation on the collapse sequence of an RC frame during L'Aquila 2009 earthquake, M.G. Mulas, L. Martinelli, F. Perotti
- 12:15:** Back-analysis of the collapse of a metal truss structure, C. Crosti, F. Bontempi

Session W2G: Repair, Strengthening & Retrofitting

Chair: Prof. M. Schmidt, Univ. of Kassel, Germany

- 13:30:** The strengthening and widening of the Okavango River Bridge in Northern Namibia, W. Martin
- 13:45:** CFRP strengthening of steel I-beam against local web buckling: A numerical analysis, M.A. Ghareeb, M.A. Khedr, E.Y. Sayed-Ahmed
- 14:00:** Timber beams with external strengthening based on CFRP and GFRP composites, M. Karmazinova
- 14:15:** Bond characterization between historical concrete substrate and SRG/SRP strengthening systems, E. Stievanin, F. da Porto, M. Panizza, E. Garbin, C. Modena
- 14:30:** Methods of silo strengthening walls in practice, M. Kaminski, M. Maj
- 14:45:** Study on mechanical behaviour of circular concrete columns confined by HFRP under axial compressive load, L.J. Li, S.D. Xu, L. Zeng, Y.C. Guo

Session W3G: Repair, Strengthening & Sustainable Construction

Chair: Prof. M. Karmazinova, Brno Univ. of Technology, Czech Republic

- 15:30:** Research on concrete repair materials, G. Lagoda, T. Gajda
- 15:45:** Energy harvesting for the sustainability of structures and infrastructures, K. Gkoumas, F. Petrini, S. Arangio, C. Crosti
- 16:00:** Sustainability considerations for tunnel projects, J. Sauer, O. Fischer
- 16:15:** Challenges in rehabilitation techniques in strengthening cracked concrete beams, M.K. Murthy, N. Munirudrappa, S.A.K. Zai, J. Guruswamy, S. Krishnan

Stream H: Room LS1E

Session M1H: Special Session: Structural Engineering for Renewable Energy I

Organisers: Prof. W. Kratzig, Ruhr Univ. Bochum, Germany & Prof. C. Borri, Univ. of Firenze, Italy

Chair: Prof. W. Kratzig, Ruhr Univ. Bochum, Germany

- 10:30:** Wind loading on solar chimneys: From wind tunnel experiments to CFD simulation, F. Lupi, C. Borri, H-J. Niemann
- 10:50:** Stability and nonlinear behaviour of RC solar updraft towers, R. Harte
- 11:10:** An analysis of an optimised solar thermal chimney for desert deployment, P. Cottam, P. Duffour, P. Fromme
- 11:30:** Solar energy systems under impact of aeolian sand and dust, C. Kalender-Wevers, U. Winkelmann, R. Hoeffler
- 11:50:** Constructability aspects for reinforced concrete solar updraft power plants chimneys: From construction technology and logistics to schedules and costs: Data requirements for economical evaluation, L. Laußat, N. Warkus, M. Helmus

Session M2H: Special Session: Structural Engineering for Renewable Energy II

Organisers: Prof. W. Kratzig, Ruhr Univ. Bochum, Germany & Prof. C. Borri, Univ. of Firenze, Italy

Chair: Prof. W. Kratzig, Ruhr Univ. Bochum, Germany

- 13:30:** SHM strategies, application and measurements on tripod offshore wind energy converters within the German offshore park Alpha Ventus, W. Ruecker, S. Thoens, S. Said, W. Schmid

- 13:50:** A comparative study about the effects of linear, weakly and fully nonlinear wave models on the dynamic response of offshore wind turbines, E. Marino, G. Stabile, C. Borri, C. Lugni
14:10: Structural health monitoring for life-cycle estimation of on-shore wind energy converters, R. Hoeffler, D. Hartmann, S. Lachmann, X. Liu, K.R. Leimbach

Session M3H: Plates, Shells, Laminated Composite & Sandwich Structures I

Chair: Prof. J. Schroeder, Univ. of Duisburg-Essen, Germany

- 15:30:** Modelling and nonlinear FE analysis of composite shells at finite rotations, R. Schmidt, M.N. Rao, T.D. Vu (Invited Paper)
16:00: Simplified modelling of stiffened panels for simultaneous static and dynamic optimisation, L. Weiss, H. Koeke, C. Huehne
16:15: Finite element vibration analysis of pole structures made of advanced composite materials, G.D. Kim, S.Y. Lee
16:30: Using the polynomial annihilation edge detection for locating delamination in laminated composite plates, C. Surace, H. Darwich, M. Gherlone
16:45: Experiments on fatigue behaviour of sandwich panels, H. Nelke, J. Lange

Session T1H: Plates, Shells, Laminated Composite & Sandwich Structures II

Chair: Prof. R. Schmidt, RWTH Aachen, Germany

- 10:30:** Bending and buckling of circular sandwich orthotropic plates with corrugated cores, K. Magnucki, M. Walachowski, E. Magnucka-Blandzi (Invited Paper)
11:00: Modelling and simulation of large amplitude vibrations of layered composite and smart structures, R. Schmidt, M.N. Rao, T.D. Vu
11:15: On the design of plates and stiffeners of rectangular industrial ducts, T. Thanga, K.S. Sivakumaran, B. Halabieh
11:30: Structural behaviour of flexible straws, B. Zhang, Z. You
11:45: A strain gradient Reissner-Mindlin micro-plate model obtained through an asymptotic analysis, M. Serpilli
12:00: Inelastic buckling of annular plates in shear, J. Becque
12:15: A novel analytical solution of orthotropic rectangular thick plate, B. Pan, H. Liu

Session T2H: Steel Joints & Steel Connections I

Chair: Prof. C. Rogers, McGill University, Canada

- 13:30:** Lateral torsional buckling behaviour of members in steel structures with hanging-profile connections, D. Liu, J. Lange
13:45: Design bearing stresses for injection bolts with short and long duration high loads, A.M. Gresnigt, D. Beg
14:00: On evaluation of a unified moment-rotation characteristic of steel and steel-concrete composite joints, M.A. Gizejowski, W. Barcewicz, J. Uziak, A.A.K. Saleh
14:15: The influence of the bolt grade on its behaviour under combined tension and shear, A. Renner, J. Lange
14:30: Finite element modelling of CHS T-joints strengthened using through bolts, M.A. Mohamed, A.A. Shaat, E.Y. Sayed-Ahmed
14:45: Seismic behaviour of welded and bolted I-beam to box column connections, Q.Y. Song, A. Heidarpour, X.L. Zhao

Session T3H: Steel Joints & Steel Connections II

Chair: Prof. A.M. Gresnigt, Technical Univ. of Delft, Netherlands

- 15:30:** In-plane shear flexibility evaluation of fastened steel flat plate by numerical simulation considering the interaction between connectors and thin plate, F. Bakhti, R. Tremblay, C.A. Rogers

15:45: Connections by adherence: A numerical analysis of preliminary push-out tests, H.J.F. Diogenes, A.L.H.C. El Debs, M.K. El Debs

16:00: New experimental method for determining the stiffness and strength of steel storage rack floor connections, F. Roure, M.M. Pastor, M.R. Somalo, M. Casafont

16:15: Analytical approach for the determination of the strength and stiffness of the T-stub with four rows of bolts, N. Mehidi, F.Z. Mimoune, M. Mimoune, A. Bouchair

16:30: Axial capacity of transverse branch plate-to-CHS T-joints, A.A. Shaat

Session W1H: Steel-Concrete Composite Construction

Chair: Prof. R. Zandonini, Univ. of Trento, Italy

10:30: Sustainable composite beams with deconstructable bolted shear connectors, S.S.M. Lee, M.A. Bradford

10:45: Numerical simulations of concrete-composite-slabs with perforated metal sheets, S. Pirringer, J. Kollegger

11:00: A computer method for design and M-N-Phi analysis of composite steel-concrete cross-sections, C.G. Chiorean, A. Chira, M. Buru

11:15: Load-carrying capacity of steel and high-strength concrete composite columns, M. Karmazanova, J.J. Melcher

11:30: Behaviour of multi-span composite steel-concrete beams subjected to combined flexure and torsion, E.L. Tan, B. Uy, G. Hummam

11:45: Nonlinear inelastic analysis of 3D composite steel-concrete frameworks, C.G. Chiorean, M. Buru, A. Chira, I. Marchis

12:00: Square concrete filled steel hollow columns, M. Dundu

12:15: Study on the loading transferring efficiency of large dimension CFT column in joint zone with internal stiff ring, Y.Y. Chen, X.Z. Zhao, N.N. Yan, S.Y. Wu

Session W2H: Thin-Walled Sections

Chair: Dr. A. Masarira, Anglo American, South Africa

13:30: Flexural-torsional analysis of shear-deformable monosymmetric thin-walled open members: I: Closed-form solution, M.A. Hjadi, M. Mohareb

13:45: Flexural-torsional analysis of shear-deformable monosymmetric thin-walled open members: II: Finite element formulation, M.A. Hjadi, M. Mohareb

14:00: Finite element simulation of perforated rack section columns, A.M. Sarmanho Freitas, M.S.R. Freitas, F.T. Souza

14:15: Flexural strength of single channels restrained by angle cleats, G.M. Bukasa, M. Dundu

END