



UNIVERSITY OF CAPE TOWN



The Seventh International Conference on Structural Engineering, Mechanics and Computation

Cape Town, South Africa, 2-4 September 2019

PROVISIONAL PROGRAMME

Sunday 1 September: Welcome Reception

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

- 15:30-18:00 Onsite Registration & Collection of Conference Bags
- 16:20-16:30 Welcome by the Conference Chair
- 16:30-17:15 Keynote Lecture**
- 17:15-18:00 Conference Welcome Reception

Monday 2 September: Opening Session **Southern Sun Cape Sun Hotel, Cape Town**

- 07:30-10:00 Onsite Registration & Collection of Conference Bags
- 07:30-08:00 Arrival Tea and Coffee
- 08:00-08:15 Welcome by UCT Deputy Vice-Chancellor for Research
- 08:15-08:30 Introductory Remarks by the Conference Chair
- 08:30-10:00 Keynote Lectures**

Mon 2 – Wed 4 Sept: Plenary & Parallel Sessions **Southern Sun Cape Sun Hotel, Cape Town**

Programme Structure

- 08:00-08:30 Tue & Wed: Arrival Tea and Coffee
- 08:30-10:00 Mon & Tue: Plenary Session; Wed: Parallel Sessions: 6 Streams (A to F)
- 10:00-10:30 Tea & Coffee Break
- 10:30-12:30 All 3 Days: Parallel Sessions: 6 Streams (A to F)
- 12:30-13:30 Lunch Break
- 13:30-15:30 All 3 Days: Parallel Sessions: 6 Streams (A to F)
- 15:30-16:00 Tea & Coffee Break
- 16:00-18:00 All 3 Days: Parallel Sessions: 6 Streams (A to F)

General Note

The four timetable periods of the Conference, from 2 to 4 September, will be denoted as follows:

Period 1: 08:30-10:00; **Period 2:** 10:30-12:30; **Period 3:** 13:30-15:30; **Period 4:** 16:00-18:00

The Monday and Tuesday plenary presentations will be in Period 1. Parallel sessions will run in Periods 2, 3 and 4 on Monday and Tuesday, and in all four Periods (1, 2, 3 and 4) on Wednesday.

Plenary Presentations

Sunday 1 September: At the Welcome Reception

16:30-17:15 **Keynote Lecture: Advancing frontiers in finite element procedures**
Prof. Klaus-Jürgen Bathe, Massachusetts Institute of Technology, USA

Monday 2 September: Period 1

08:30-09:15 **Keynote Lecture: Recent developments in cold-formed steel structures**
Professor Ben Young, The Hong Kong Polytechnic University, China

09:15-10:00 **Keynote Lecture: Using fabric to shape FRP-reinforced concrete structures**
Professor Tim Ibell, University of Bath, UK

Tuesday 3 September: Period 1

08:30-09:15 **Keynote Lecture: Design of high performance steel-concrete composite structures**
Professor Brian Uy, University of Sydney, Australia

09:15-10:00 **Invited Lecture: Details and assembly of two membrane-cladded cable-net roofs**
Professor Hartmut Pasternak, Brandenburg University of Technology, Germany

Parallel Session Presentations

Six 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: Material Modelling, Multi-Scale Modelling, Porous Media, Composite Materials, Functionally Graded Materials, Micromechanics of Advanced Materials and Processes, Manufacturing Processes, Numerical Schemes, Numerical Simulations, Computing, Finite Element Modelling, Damage Mechanics, Damage Modelling, Fracture, Fatigue

STREAM B: Dynamic Analysis, Vibration Response, Vibration Control, Environmental Vibrations, Human-Induced Vibrations, Seismic Response, Seismic Analysis, Earthquake-Resistant Design, Fluid-Structure Interaction, Blast, Impact, Shock, Explosion Loading, Railway Bridges, Railway Infrastructure, Highway Bridges

STREAM C: Composite Structures, Laminated Structures, Sandwich Structures, Adaptive Structures, Renewable Energy Structures, Plates, Shells, Membranes, Cable Structures, Lightweight Structures, Space Structures, Safety and Reliability, Structural Design, Architectural Considerations, Building Technology, Structural Engineering Education

STREAM D: Stability of Beams and Columns, Thin-Walled Sections, Cold-Formed Steel Structures, Stainless Steel Structures, Aluminium Structures, Steel Structures, Steel Connections, Steel-Concrete Composite Construction, High Strength Steel, High Performance Steel, Performance of Structures in Fire, Design for Fire Resistance

STREAM E: Reinforced Concrete Structures, Prestressed Concrete, High Strength Concrete, High Performance Concrete, Fibre-Reinforced Concrete, Mechanics of Concrete, Properties of Concrete, Construction Materials, Construction Technology, Pavement Design, Masonry Structures, Glass Structures, Timber Structures, Properties of Wood

STREAM F: Structural Health Monitoring, Damage Detection, Maintenance, Durability, Long-Term Performance, Structural Assessment, Historic Structures, Collapse Behaviour, Failure Analysis, Repair, Strengthening, Retrofitting, FRP Applications, Soil-Structure Interaction, Foundations, Underground Structures, Geotechnical Engineering, Rock Mechanics

Programme for Parallel Sessions

The Programme for Parallel Sessions is presented below, stream by stream. The session code has 4 characters: the first is a letter indicating the **Stream** (A, B, C, D, E or F), the second is a hyphen, the third is a letter indicating the **Day** (M: Mon; T: Tue; W: Wed), and the fourth is a number indicating the **Period** (1, 2, 3 or 4). For example, D-T3 denotes the parallel session of Stream D that runs on Tuesday in Period 3 (13:30-15:30). Excluding the Plenary Sessions, the Programme features a total of 60 Parallel Sessions.

STREAM A

A-M2: Material Modelling, Multi-Scale Modelling, Porous Media

Special Session SS04: Multiscale Models of Multiphase Porous Media

Organisers: Prof. Tim Ricken, University of Stuttgart, Germany; Prof. Jörg Schröder, University of Duisburg-Essen, Germany

10:30: On the simulation of fracking processes in porous media by use of a phase-field approach, W. Ehlers, C. Luo (Invited Paper)

11:00: Modelling of nonlinear concrete behaviour: Microplane and phase-field approaches, C. Steinke, I. Zreid, M. Kaliske (Invited Paper)

11:30: Hydrogels: A macroscopic approach based on microscopic physics, K. Keller, T. Ricken, T. Wallmersperger

11:45: Vibration analysis of stochastic open-cell foam, K. Weinberg, L. Bogunia

12:00: Two-scale modelling of reinforced concrete deep beams: Choice of unit cell and comparison with single-scale modelling, A. Sciegaj, A. Mathern

12:15: A multiphase material model considering strain-induced crystallisation in polymers, K. Loos, A. Lion, M. Johlitz, J. Calipel

A-M3: Material Modelling, Multi-Scale Modelling, Porous Media

Special Session SS04: Multiscale Models of Multiphase Porous Media

Organisers: Prof. Tim Ricken, University of Stuttgart, Germany; Prof. Jörg Schröder, University of Duisburg-Essen, Germany

13:30: A finite element formulation for freezing and thawing processes of ice within the framework of the TPM, A. Schwarz, J. Bluhm, J. Schröder

13:45: Comparative study on time-integrator schemes in a least-squares sea ice finite element formulation, C. Nisters, J. Schröder, R. Niekamp, T. Ricken

14:00: Development of a thermodynamically consistent model towards biogeochemical processes within Antarctic sea ice microstructure within the extended Theory of Porous Media (eTPM), A. Thom, T. Ricken

14:15: Computational modelling of the dynamics of sea ice in the Antarctic marginal ice zone, R. Marquart, A. Bogaers, M. Vichi, K. MacHutchon, J. Schröder, S. Skatulla

14:30: A review on modelling of brine transport mechanisms in sea ice, A.D. Cook, S. Skatulla, K. MacHutchon, T. Ricken, J. Schröder

14:45: Transition of the variational sensitivity analysis to polymorphic uncertainty quantification to soil investigations, C. Henning, T. Ricken

15:00: A multiscale and multiphase model for the description of function-perfusion processes in the human liver, L. Lambers, T. Ricken, M. König

15:15: A hyperelastic biphasic fibre-reinforced model of articular cartilage incorporating the influences of osmotic pressure and damage, F. Egli, T. Ricken, X. Wang, D.M. Pierce

A-M4: Material Modelling, Composite Materials, Piezoelectric Solids

16:00: A rational framework for dynamic homogenization at finite wavelengths and frequencies, B.B. Guzina, S. Meng, O. Oudghiri-Idrissi

16:15: Bloch-based and homogenization procedures for investigating wave propagation periodic poroelastic structures, V.-H. Nguyen, E. Rohan, S. Naili

16:30: Novel vistas on the foundations of peridynamics, P. Steinmann, A. McBride, A. Javili

16:45: Nonlocal simulation of failure evolution with MD and MPM: A case study, Z. Chen, Y. Su, J. Tao, F.M. Pfeiffer

17:00: Invariant-free hyperelasticity using a fourth-order structural tensor approach, D.J. O'Shea, M.M. Attard, D.C. Kellermann

17:15: Modelling the flexoelectric effect in solids, A. McBride, D. Davydov, P. Steinmann

17:30: A semi-analytical method of solution of contact problems on indentation of coated elastic and electroelastic piezoelectric solids, A.S. Vasiliev, S.S. Volkov, S.M. Aizikovich

17:45: On nonlinear thermo-magneto-electro-elasticity and FE analysis of magneto-electro-elastic structures, R. Schmidt, M.N. Rao, K.-U. Schröder

A-T2: Micromechanics of Advanced Materials and Processes

*Special Session SS14: Micromechanics of Advanced Materials and Processes
Organisers: Prof. Liguo Zhao & Dr. Anish Roy, Loughborough University, UK*

10:30: Deformation characteristics in 6H silicon carbide: Effects of length scale and irradiation, D.Z. Zhang, L.G. Zhao, A. Roy, Y.-L. Chiu (Invited Paper)

11:00: Evaluation of the adhesive bonding of aluminium alloys produced by hot form quenching for automotive applications, F. Sun, C.I. Pruncu, J. Jiang, B.R.K. Blackman, J. Lin

11:15: Plastic deformation micro-mechanisms in magnesium and its alloys, J. Wu, S. Si, U. Ghori, Y.L. Chiu

11:30: Modelling the temperature and strain-rate effects of extruded magnesium alloy accounting for deformation slip and twinning, R. Zhou, A. Roy, V.V. Silberschmidt

11:45: Initiation and growth of short cracks in a nickel-based single crystal superalloy, L. Zhang, L.G. Zhao, A. Roy, V.V. Silberschmidt, G. McColvin

12:00: Modelling crack-tip behaviour in a directionally solidified nickel alloy under fatigue-oxidation conditions, R.J. Kashinga, L.G. Zhao, V.V. Silberschmidt

12:15: Vibration-assisted robotic machining in advanced materials, K.H. Pang, D. Wang, A. Roy, I. Redman, M. Castelli, J. Dunleavey, D. Dawson, L. Parkinson, K. Lindsey, M. Lidgett

A-T3: Advanced Materials and Manufacturing Processes

13:30: Optimising the performance of interference-fitted work rolls, J.D. Booker, M.D. McMillan

13:45: Relation between part curvature and warpage in injection molding process, M. Szostak, P. Poszwa, I. Gontariew, P. Brzęk

14:00: Mapping high temperature strain localisation in steel weldments using digital image correlation, R. Curry, R.D. Knutsen, K. Singh

14:15: Influence of material properties on spontaneous buckling of thin-walled injection molded parts, P. Poszwa, I. Gontariew, M. Szostak, P. Brzęk

14:30: 3D printing with steel: Additive manufacturing of connection elements, T. Feucht, J. Lange

14:45: The influence of material temperature on the in-print strength and stability of a 3D print mortar, F.P. Bos, R.J.M. Wolfs, Z.Y. Ahmed, L.J. Hermens, T.A.M. Salet

15:00: FEM modelling of digitally printed concrete structures using 3D extrusion, L. Jendele, J. Cervenka, M. Vaitova

15:15: A new mechanical model for metallic wire ropes, F. Foti, C. Guerini, A. Marengo, L. Martinelli

A-T4: Numerical Methods, Numerical Simulations, Numerical Modelling

16:00: Chances of real-time simulation in FE analyses with conventional hardware, M.W. Zehn, D. Marinkovic (Invited Paper)

16:30: Simulation of buoyancy-driven fracture propagation using the displacement discontinuity boundary element method, J.A.L. Napier, E. Detournay

16:45: Stochastic modelling of the cold forming process, J.D. Booker, J. Woodhead

17:00: Improved structural mechanics simulation by considering residual stress and strain properties from metal forming simulation, D. Ulrich, H. Binz, R. Meissner, M. Liewald, A. Dietrich

17:15: Evaluating artificial neural networks and quantum computing for solving mechanical boundary value problems, A. Mielke, T. Ricken

A-W1: Numerical Modelling, Finite Element Analysis

08:30: An efficient Latin hypercube sampling for probabilistic nonlinear finite element analysis of reinforced concrete structures, N.L. Tran, C.-A. Graubner, G. Rombach

08:45: Finite element analysis of concrete members reinforced with GFRP reinforcements, R. Barrage, G.J. Milligan, M.A. Polak

09:00: Finite element modelling of tensile reinforcement laps in steel fibre reinforced concrete, P. Grassl, J. Middlemiss

09:15: Numerical simulation of carbon reinforced concrete structures and uncertain data, W. Graf, F. Leichsenring, D. Konopka, M. Kaliske

09:30: A 3D beam element to study torsion of steel open sections exposed to fire, L. Possidente, N. Tondini, J.M. Battini

09:45: Friction moments of ball joint supports used in structural test rigs subjected to cyclic loading, M. Rosemeier, T. Gebauer, C. Lester, M. Bätge

A-W2: Damage Mechanics, Damage Modelling, Fracture, Fatigue

10:30: Virtual testing of plasticity effects on fatigue crack initiation, M. Mlikota, S. Schmauder (Invited Paper)

- 11:00:** Prediction of the initial fatigue crack location of automatically welded tubular joints for jacket support structures, P. Schaumann, K. Schürmann, A. Pittner, M. Rethmeier
- 11:15:** FE modelling of fracture in quasi-brittle material, M.A. Scamardo, A. Franchi, P.G. Crespi
- 11:30:** Cyclic properties of P91 steel at variable temperatures, W. Egner, P. Sulich, H. Egner, S. Mroziński
- 11:45:** The effects of aspect ratio and bi-axial loading on the initiation of plastic deformation in three-dimensional semi-elliptical defects, S.O.S. bin Syed Kamil, N.O. Larrosa
- 12:00:** A study on delamination onset and propagation in CFRP beam specimens with mechanical coupling, S. Samborski, J. Rzeczkowski, J. Paśnik
- 12:15:** Fatigue analysis of a vehicle using vibration modes, T.Y. Kim, Y.G. Hwang, W.S. Yoo, S.G. Yoon, Y.J. Shin

A-W3: Damage Mechanics, Damage Modelling, Fracture, Fatigue

- 13:30:** Modelling of discrete cracks in reinforced concrete plates with the Strong Discontinuity Approach (SDA), U. Häussler-Combe, A. Chihadeh, A. Shehni
- 13:45:** Effects of impactor mass on pultruded profiles subjected to low-velocity impacts, Z. Li, H. Wang, B. Aryal, P.J. Hazell, A. Khennane, K. Shankar, J.P. Escobedo-Diaz
- 14:00:** A phase field modelling of dynamic brittle fracture at finite strains, E. Omatuku, S. Skatulla
- 14:15:** Strain-based approach to fatigue crack initiation on high-strength-steel welded joints under multiaxial loading, M. Garcia, A. Nussbaumer, H. Remes
- 14:30:** Design of pressurised pipes subjected to mechanochemical corrosion, Y. Pronina
- 14:45:** Finite element modelling of steel-concrete bond for corroded reinforcement, Q. Du, B. Martín-Pérez
- 15:00:** Experimental investigation of water leakages through a longitudinal crack due to expansion of the pipe material under pressure, D.T. Ilunga, M.O. Dinka, D. Madyira

STREAM B

B-M2: Dynamic Analysis, Vibration Response, Vibration Control

- 10:30:** Railway vehicle dynamics interaction with a flexible track, J. Ambrosio, J. Costa, P. Antunes, H. Magalhaes, J. Pombo (Invited Paper)
- 11:00:** An efficient semi-analytical procedure for assessing aeolian vibrations of overhead transmission lines, C. Gazzola, F. Foti, L. Martinelli, F. Perotti
- 11:15:** On the analysis of passive vibration mitigation of nose landing gears, M. Rahmani, K. Behdian
- 11:30:** An iterative linear matrix inequality controller-design strategy for H-infinity structural vibration control, F. Palacios-Quiñonero, J. Rubió-Massegú, J.M. Rossell, H.R. Karimi
- 11:45:** Inhomogeneous beam-like models for the dynamic analysis of multistorey buildings, A. Greco, I. Fiore, S. Caddemi, I. Calì, G. Occhipinti
- 12:00:** Influence of damping effect on the dynamic response of plate, L. Borkowski
- 12:15:** FEM modelling of different factors affecting the cross-wind direction vibrations of a tall building steel spire, M.D. Gajewski, R.B. Szczerba, M.A. Gizejowski, M. Siennicki, S. Wierzbicki

12:30: Dynamic analysis of unbalanced rotary machine support structures considering the effect of loading on the geometric stiffness, R.M.L.R.F. Brasil

B-M3: Environmental Vibrations

Special Session SS17: Environmental Vibrations

Organisers: Prof. Lars Vabbersgaard Andersen, Aarhus University, Denmark; Dr. Peter Persson, Lund University, Sweden

13:30: Evaluating the effect of vibration isolation mats on train-induced ground vibrations, J. Malmberg, K. Persson, P. Persson

13:45: Hybrid approach for the assessment of vibrations and re-radiated noise in buildings due to railway traffic: Concept and preliminary validation, P. Alves Costa, R. Arcos, P. Soares, A. Colaço

14:00: A surrogate model for vibration transmission in layered soil, L.V. Andersen, P. Bucinkas, P. Nguyen, L. Manuel, P. Persson

14:15: Ground-borne vibrations induced by pile driving: Prediction based on numerical approach, C. Mont'Alverne Parente, P. Alves Costa, A. Silva Cardoso

14:30: Offshore pile driving noise: Capability of numerical prediction models and ways to consider new technologies, S. Lippert, O. von Estorff

14:45: Analysis of vibrations on the historical structures induced by technical seismicity, Sh. Urushadze, M. Pirner, J. Bayer

15:00: Dynamic structure response using surrogate models, P. Bucinkas, L.V. Andersen

15:15: Surrogate models for the prediction of SFSI relevance in earthquake-induced vibrations of buildings: A case study, L. de Sanctis, P. Franchin, M. Iovino, F. Noto

B-M4: Human-Induced Vibrations, Floor Vibrations

16:00: Dynamic analysis of a steel footbridge under running pedestrians, M.G. Mulas, M. Pisani, F. Beekmans, P. Latteur

16:15: Serviceability assessment of a pedestrian bridge: Concrete vs. GFRP composite deck, I.J. Drygala, J.M. Dulinska, R. Ciura

16:30: Human induced vibration of staircases: Measurements and analysis, I. Kraincanic, A. Sparkes

16:45: A surrogate model to describe uncertainties in wood floor modal frequencies, H.U. Lim, L. Manuel, P. Persson, L.V. Andersen

17:00: Influence of uncertain parameters on modal properties of wood floors, P. Persson, C. Frier, L. Pedersen, L.V. Andersen, L. Manuel

B-T2: Seismic Response, Seismic Analysis, Earthquake-Resistant Design

10:30: A new perspective on seismic intensity measures (IMs), M. Grigoriu

10:45: Control of dynamic collapse mechanism of double-layer truss walls by means of fuse type connections subjected to earthquake motion, K. Ishikawa

11:00: A rational methodology for the design of linked compound shear walls in tall buildings in high-seismic regions, G. Vannini, F. Bazzucchi, G.A. Ferro, D. Shook, N.J. Mathias, M. Sarkisian

11:15: A frame structure with elastically embedded diaphragms for regions with increased seismicity, J. Witzany, R. Zigler, T. Čejka, A. Polák, D. Makovička

11:30: The influence of spatial variations of mass eccentricities on the earthquake induced torsion in buildings, G.K. Georgoussis, A. Mamou, M.T. Kyrkos

11:45: The effect of the rupture distance of the earthquake on the seismic response of wind turbine support towers, J. Wang, A.J. Sadowski, A. Camara

12:00: Experimental evaluation of CFS braced-truss shear wall under cyclic loading, S. Shafaei, H.R. Ronagh, N. Usefi

12:15: Effect of shear modulus and shape factor on the performance of prototype unbonded fibre reinforced elastomeric isolators, T.V. Ngo, S.K. Deb, A. Dutta

B-T3: Seismic Response, Seismic Analysis, Earthquake-Resistant Design

13:30: Numerical prediction of out-of-plane instability in RC walls subject to in-plane cyclic loading, F. Dashti, R.P. Dhakal, S. Pampanin (Invited Paper)

14:00: Seismic assessment of a U-beam composite material footbridge under earthquake sequence, I.J. Drygala, M.A. Polak

14:15: Evaluation of FEMA P-58 overturning fragility curves for freestanding building components, A. Lucchini, O. AlShawa, L. Sorrentino

14:30: Benefits of submodelling in dynamic analysis of an integral bridge, P. Boron, J. Dulinska, D. Jasinska

14:45: The 'skeleton curve' as a tool for seismic risk analyses of buildings, F. Braga, C. Picchi

15:00: The analysis of damage evolution in a gravity dam under a seismic shock, P. Boron, J. Dulinska, D. Jasinska, M. Torba

15:15: Seismic behaviour of Gothic transversal arcades: A preliminary parametric investigation, G. De Matteis, D. Cacace, M. Zizi, J. Rouhi

B-T4: Fluid-Structure Interaction

16:00: A case study for sloshing phenomenon in a cylindrical tank under seismic events: Numerical modeling and comparison with current regulations, G. Buccino, C. Guerini, F. Perotti

16:15: Effect of coupling with internal and external fluids on the mechanical behaviour of aerostats, J.-S. Schotté, R. Le Mestre, O. Doaré

16:30: Nonlinear fluid-structure interaction of a restrained slender body of revolution at high angles of attack, D. Degani, O. Gottlieb, M. Ishay

16:45: Vibration fatigue analysis of liquid-filled pipelines considering fluid-structure interaction, Y. Jiang, J. Tao, L. Zhu

17:00: Segment gate model testing of the Stajićevo Sluice, E. Popović

B-W1: Blast, Shock and Explosion Loading

Special Session SS10: Explosion Loading and Response Characteristics

Organisers: Prof. Genevieve Langdon, University of Cape Town, South Africa; Dr. Samuel Rigby, University of Sheffield, UK

08:30: Near-field blast loading and transient target response: A collaboration between Sheffield and Cape Town, S.E. Rigby, A. Tyas, R.J. Curry, G.S. Langdon

08:45: A dimensionless number for shock-structure interaction, T.J. Cloete, G.N. Nurick

09:00: Numerical simulation of underwater subway tunnel subjected to internal blast loading, J. Mandal, M.D. Goel, A.K. Agarwal

09:15: Response of a structural target to an explosive charge incorporating foreign objects, G. Kang, S. Chung Kim Yuen

09:30: Comparison of curved GFRE foam sandwich panels response to close-proximity air-blast loading: Influence of curvature and load direction, C.J. von Klemperer, G.S. Langdon, G. Sinclair, I. Ghoor

09:45: Numerical evaluation of simple blast wall system to be used in developing countries, A.T. Hussein, H.N. Mahmoud, P.R. Heyliger

B-W2: Blast, Shock & Impact Loading

Special Session SS10: Explosion Loading and Response Characteristics

Organisers: Prof. Genevieve Langdon, University of Cape Town, South Africa; Dr. Samuel Rigby, University of Sheffield, UK

10:30: Blast mitigation of reinforced concrete hollow core slabs using CFRP as externally bonded reinforcement, A. Maazoun, S. Matthys, B. Belkassem, D. Lecompte, J. Vantomme

10:45: Investigation into the effect of V-tip radius on the blast performance of steel V-plates, V.R. Shekhar, G.S. Langdon, C.J. von Klemperer

11:00: Experimental response of S2-glass fibre reinforced composites to localised blast loading, A. Daliri, R.J. Curry, H. Bornstein, G.S. Langdon, R. Odish, A. Orifici

11:15: Simulation of ATD pelvic response of an under body blast, Z. Schutte, T. Pandelani, G.S. Langdon, C. Mahlase, R. Ahmed

11:30: Dynamic response of blast loaded metal plates with composite beam stiffeners, T.P. Masango, G.N. Nurick, G.S. Langdon

11:45: Crash analysis of foam and concrete filled automatic retractable bollard under vehicle impact, M.D. Goel

12:00: Assessment of deformation pattern and energy absorption capacity of a novel fourfold-tube nested system under oblique impact loading, B. Xu, C. Wang, S. Chung Kim Yuen, W. Xu

12:15: Buckling of the flexible rod under shock loads, A.V. Egorov, V.N. Egorov

B-W3: Railway Bridges, Railway Infrastructure

Special Session SS16: Railway Infrastructures

Organisers: Prof. Diogo Ribeiro, Instituto Superior de Engenharia do Porto, Portugal; Dr. Fulvio Busatta, University of Cape Town, South Africa; Prof. Rui Calçada, Universidade do Porto, Portugal

13:30: Running safety assessment of a high-speed train moving over the new Volga River Bridge subjected to crosswinds, P.A. Montenegro, R. Calçada, A. Bolkovoy, I. Chebykin

13:45: Pantograph-catenary interaction in curved railway tracks, J. Ambrósio, P. Antunes, J. Pombo, A. Facchinetti

14:00: Investigation of track-bridge interaction in railway cable-stayed bridges under train braking, Y.H. Yan, D.J. Wu, Q. Li, A. O'Connor, M. Nogal

14:15: Dynamic analysis of high-speed precast railway bridges, D. Nunes, C. Gomes, J. Terra, D. Ribeiro, R. Calçada

14:30: Application of the SPS technology in short-span railway bridges, P. Händler, J. Lange

14:45: Maintenance and recovery of bridges and tunnels in a freight traffic railway line, A.M. Bonatto, F.A.F. Furtado, C.V. Schlögel

15:00: Investigating heavy haul train loading spectra through weigh-in-motion big data analysis, F. Busatta

15:15: Real-time hybrid simulation of a bridge-damper system, S. Tell, A. Andersson, R. Karoumi, A. Najafi, B.F. Spencer Jr.

15:30: Assessment of the dynamic behaviour of the railway bridge over the Sado River based on a monitoring system, A. Meixedo, R. Calçada, D. Ribeiro, J. Santos

B-W4: Highway Bridge Loading, Bridge Engineering, Case Studies

16:00: Modelling of permit trucks for bridge loading along German highways, M. Nowak, O. Fischer

16:15: Evaluating the influence of daily truck traffic flow on load effects using Monte Carlo simulations, S. Perez Sifre, R. Lenner

16:30: Implication of constructing the New Mhloti River Deck monolithically with the existing deck, A.J. Faure, W.J. Martin

16:45: Multiple reduction factors based on WIM data, P.F. van der Spuy, R. Lenner, T. de Wet, C.C. Caprani

17:00: The development of a vehicle-bridge interaction model for South African traffic, M.W. Meyer, R. Lenner, P.F. van der Spuy

17:15: Design of the new Olifants river arch bridge in the Western Cape province of South Africa, P.F. van der Spuy, H.J. Niehaus

17:30: Dynamic amplification factor for South African bridges, P.F. van der Spuy, R. Lenner, M.W. Meyer

17:45: Reliability verification of bridges designed according to TMH-7, S.E. Basson, R. Lenner

STREAM C

C-M2: Composite Structures, Laminated Structures, Sandwich Structures

Special Session SS01: Modelling and Optimization of Composite Structures

Organisers: Prof. Aurelio Araujo & Prof. Jose Madeira, University of Lisbon, Portugal

10:30: Finite element modelling of CFRP fuselage panels under high velocity transverse impact loading, F. Fonseca, A.P.C. Duarte, N. Silvestre (Invited Lecture)

11:00: From buckliphobes to buckliphiles: Recent developments in exploiting positive virtues of instability, M.A. Wadee, A.T.M. Phillips, A. Bekele (Invited Paper)

11:30: Optimal location of active piezoelectric sensors and actuators for noise reduction in composite sandwich panels, A.L. Araújo, J.F.A. Madeira, A.J.M. Ferreira

11:45: Isotropic and orthotropic parameter identification from full field bulge inflation tests on PVC-coated polyester, C.F. Jekel, R.T. Haftka, M.P. Venter, G. Venter

12:00: Design and multi-objective optimization of a composite impact attenuator for a Formula student car, J.M.P.B.C. Castro, A.L. Araújo, J.F.A. Madeira

12:15: Compressive behaviour of carbon fibre reinforced thermoplastic lattice structures, B. Aryal, H. Wang, K. Shankar, E.V. Morozov, P.J. Hazell

C-M3: Composite Structures, Laminated Structures, Sandwich Structures

13:30: Multiscale nanocomposites and laminates reinforced by carbon nanotubes and fibres, M. Zeeman, S. Adali (Invited Paper)

14:00: Nonlinear static FE-analysis of smart piezolaminated FGM shells at finite rotations, R. Schmidt, M.N. Rao, K.-U. Schröder (Invited Paper)

14:30: A similarity transformation leading to an exact transfer matrix for the composite beam-column with refined zigzag kinematics: A benchmark example, K. Nachbagauer, H. Wimmer

14:45: Axial and flexural behaviour of elastic nano-beams by stress-driven two-phase elasticity, R. Barretta, F. Marotti de Sciarra

15:00: Flexural response of composite fibre cement sheeting-cementitious polystyrene sandwich panels, D. Makweche, M. Dundu

15:15: Multilayer composite beam-column with refined zigzag kinematics resting on variable two-parameter foundation, H. Wimmer, K. Nachbagauer

15:30: Theoretical fatigue response of plantain-fiber-based composites in structural applications, C.E. Okafor, C.S. Metu

C-M4: Space Trusses, Spatial Structures, Towers, Tensegrity Structures

*Incorporates Special Session SS13: Architectural and Structural Methods of Design and Calculation
Organiser: Prof. Janusz Rębielak, Cracow University of Technology, Poland*

16:00: 3D truss model for large deformations and large strains: Nonlinear formulation and continuum mechanical aspects, W. Guggenberger, B. Krenn (Invited Paper)

16:30: The human body: An instantaneously and dynamically self-equilibrating tensegrity structure, N. Mathias, J. Li, M. Sarkisian

16:45: Paper-based water tower for post-disaster emergency scenarios, M. Morales-Beltran, P. Eigenraam, J. Latka

17:00: Non-linear analysis of tall telecommunication towers in South Africa, N.R. Featherston

17:15: Structural system design of spatial and shell structures by means of ‘Album of Spatial Structures’ (ALOSS), K. Ishikawa

17:30: Architectonic forms and engineering systems designed by application of method of superposition, J. Rębielak

17:45: High-strength composite materials in design process of tensegrity structures, D. Zając

C-T2: Renewable Energy Structures

*Special Session SS09: Renewable Energy Structures
Organisers: Prof. Lars Vabbersgaard Andersen & Dr. Zili Zhang, Aarhus University, Denmark*

10:30: Wind turbine structures: Challenges and market needs, M. Rauch

10:45: Efficient time-domain hydrodynamic model for floating offshore wind turbines using rational approximations, C.E. Høeg, Z. Zhang

11:00: Modal dynamics of a three-bladed tri-rotor wind turbine, O.T. Filsoof, M.H. Hansen, A. Yde, P. Bøttcher, X. Zhang

11:15: Structural vibration considerations for the design of onshore piled wind turbine foundations, N. Featherston

11:30: Experimental research of basin tuned and particle damper for wind turbine tower on shaker, J.L. Chen, Y.C. Wang

11:45: The influence of uncertain soil conditions on the dynamic response of offshore wind turbines using an efficient time-domain model, Z. Zhang, C.E. Høeg, L.V. Andersen

12:00: Cyclic tensile response of suction bucket foundations in sand, P. Gütz, M. Achmus

12:15: Analytical investigations regarding critical suction and skirt friction for bucket installations in sand, C. Schröder, M. Achmus

12:30: Dynamic response analysis of spar-type floating wind turbines against ship collision, Y.L. Ren, X.G. Hua, Z.Q. Chen, B. Chen

12:45: Influence of geometry on the dynamic behaviour of steel tubular towers for onshore wind turbines, K. Folster, K. Mudenda

C-T3: Adaptive Structures, Smart Structures

Special Session SS22: Adaptive Structures: Design, Optimisation and Control

Organisers: Dr. Gennaro Senatore & Prof. Ian Smith, Swiss Federal Institute of Technology (EPFL), Switzerland; Prof. Manfred Bischoff & Prof. Werner Sobek, University of Stuttgart, Germany

13:30: Structures that adapt to loads through large shape changes: Design and optimization, A.P. Reksowardojo, G. Senatore, I.F.C. Smith

13:45: Concentric joint connectors for form-changing space frames, P. Harkin

14:00: Adaptive structures of resilient cyclic knots, D. Kozlov

14:15: Manufacturing, optimization and design of electroactive CNT-actuators for adaptive building envelopes, R. Neuhaus, C. Glanz, I. Kolaric, J. Siegert, T. Bauernhansl

14:30: Integrating structure and control design using tensegrity paradigm, R. Goyal, R.E. Skelton

14:45: Optimal prestress design of the band gap dynamics in tensegrity metamaterials, A. Amendola, A. Krushynska, R. Miranda, F. Fraternali

15:00: Actuation of structural concrete elements under bending stress with integrated fluidic actuators, C. Kelleter, W. Sobek, T. Burghardt, H. Binz

15:15: The integration of actuation concepts and adaptive elements into an experimental high-rise building, S. Weidner, S. Steffen, W. Haase, W. Sobek, C. Honold, T. Burghardt, H. Binz, M. Böhm, J. Wagner, O. Sawodny

C-T4: Adaptive Structures, Smart Structures

Special Session SS22: Adaptive Structures: Design, Optimisation and Control

Organisers: Dr. Gennaro Senatore & Prof. Ian Smith, Swiss Federal Institute of Technology (EPFL), Switzerland; Prof. Manfred Bischoff & Prof. Werner Sobek, University of Stuttgart, Germany

16:00: Design and control of adaptive tensegrity sunscreens, R. Miranda, E. Babilio, A. Amendola, I. Mascolo, F. Fraternali

16:15: Synthesis of shape-adaptive plain bearings, S. Kirmse, B. Prase, A. Hasse

16:30: Characterization of variable stiffness joints for adaptive structures, Q. Wang, A. Habraken, P. Teuffel, G. Senatore, K. Jansen

16:45: Design of thermally deformable laminates using machine learning, A. Abdel-Rahman, M. Kosicki, P. Michalatos, M. Tsigkari

17:00: Design and development of a morphing wing utilising flexible materials, E.J. van Zyl, M.P. Venter

17:15: Design and optimization of pre-tension forces in cable-stayed bridges, M. Modano, I. Mascolo, F. Fraternali

C-W1: Shells, Membranes, Plates

08:30: Frequencies of vibrations of a spherical shell with all-round pressure, S. Shrivastava (Invited Paper)

09:00: Buckling of rectangular nanoplates, Y. Sapsathiarn, R.K.N.D. Rajapakse

09:15: Some results in the theory of chiral Cosserat elastic plates, S. De Cicco

09:30: Validation of a numerically inflated polyethylene bag, B. Bezuidenhout, G. Venter, M.P. Venter

09:45: Stresses in a pressurised parabolic ogival toroidal vessel, N. Enoma, A. Zingoni

10:00: Buckling of parabolic ogival toroidal vessels under external pressure, N. Enoma, A. Zingoni

C-W2: Structural Projects, Building Technology, Structural Engineering Education

10:30: Sandwich panels in buildings: Core, structure and design, J. Lange, A. von der Heyden, S. Grimm (Invited Paper)

11:00: Tall diagrid structures: Unique behaviour and design considerations of an unusual structure type, M. Sarkisian, N. Mathias, J. Gordon, R. Garai

11:15: Development of an innovative composite mullion, S. Jiao, S. Gunalan, B.P. Gilbert, B. Baleshan, H. Bailleres

11:30: Challenging expansions of major conference and convention centres in California, USA: Two case studies, M. Sarkisian, N. Mathias, J. Zhang, L. Hu

11:45: How much law education a civil or structural engineering graduate needs, U. Quapp, K. Holschemacher

12:00: Engineering education in Egypt: Past, present and future, E.Y. Sayed-Ahmed

C-W3: Safety & Reliability, Structural Design, Building Costs

13:30: Advances in the reliability basis of structural design, J.V. Retief, C. Viljoen (Invited Paper)

14:00: Flexibility and variability of industrial buildings, A. Harzdorf

14:15: Adaptation or adoption of Eurocode steel design: A comparison with South African standard, J. Mahachi

14:30: Generalized parametric structural design: Framework and perspectives, X. Lai, Z. He

14:45: Perspectives of experimentally based design strategies in steel engineering, I. Wudtke, M. Kraus

15:00: An analysis of South African wind gust data in the context of the built environment, F.P. Bakker, C. Viljoen

15:15: Building cost implications of tsunami design per ASCE 7-16, I.N. Robertson, J. McKamey

15:30: Cost optimization of structures and connections using the Virtual Work Optimization Method, J.H. Strydom, A. Elvin

15:45: The effect of labour and material costs on the optimization of structures using the Virtual Work Optimization Method and empirical formula, J.H. Strydom, A.A. Elvin

STREAM D

D-M2: Fire Resistance, Simulations & Modelling

Incorporates Special Session SS05: Behaviour of Structures in Fire

Organisers: Prof. Markus Knobloch, Ruhr-Universität Bochum, Germany; Prof. Mario Fontana, Swiss Federal Institute of Technology, Switzerland &

10:30: Elevated temperature resistance of welded tubular joints, Y.C. Wang, E. Ozyurt (Invited Paper)

11:00: Probability-based approach to structural fire resistance evaluation, M. Maślak (Invited Paper)

11:30: Thermal coupling in hybrid fire simulation, F. Faghihi, M. Knobloch

11:45: Studies on fire resistance of self-drilling screws and those connections, Y. Liu, F. Ozaki

12:00: Non-linear finite element analysis of a fire protected steel connection, I. Singh, G.A. Drosopoulos, G.E. Stavroulakis

12:15: Effects that change in strain ratio causes to structural fire resistance of a steel member, F. Ozaki, T. Umemura

12:30: Thermal and axial compression behaviour of full-scale concrete-filled steel-tube columns (RCFST) exposed to fire: Experimental study, M. Acito

D-M3: Performance of Structures in Fire, Design for Fire Resistance

13:30: Steel-timber connections and structures in normal and fire conditions, A. Bouchair, S. Durif, M. Audebert, D. Dhima (Invited Paper)

14:00: Numerical simulation of fire-following-earthquake at urban scale, G.P. Cimellaro, M. Domaneschi, V. Villa, M. De Iuliis (Invited Paper)

14:30: Stiffness decrease for steel end-plate beam-to-column joint when exposed to fire, M. Maślak, M. Pazdanowski, M. Snela

14:45: Estimating time to structural collapse of informal settlement dwellings based on structural fire engineering principles, A. Cicione, R. Walls

15:00: RCFST columns exposed to fire: Standard thermal test results, M. Acito, V. Lavermicocca

15:15: RCFST columns exposed to fire: Residual compression test results, M. Acito, A. Jain

D-M4: Hollow Sections, Concrete-Filled Tubes, Stainless Steel Structures, Aluminium Structures

16:00: Testing of hot-finished high strength steel SHS and RHS utilising advanced experimental techniques, X. Meng, L. Gardner

16:15: Finite element modelling of steel tubes filled with rubberized concrete under cyclic loading, A.P.C. Duarte, N. Silvestre, J. de Brito, E. Júlio

16:30: Concrete-filled double-skin circular tubes with high strength concrete, Y. Essopjee, M. Dundu, C. Maluleke

16:45: RCFST columns exposed to fire: Non-standard thermal test and “hot” compression test results, M. Acito, C. Chesi

17:00: Structural stainless steel design by advanced analysis with CSM strain limits, F. Walport, L. Gardner, D.A. Nethercot

17:15: Stainless steel beams of slender I-section, M. Šorf, M. Jandera

17:30: An assessment of rolled stainless steel angles under compression, A. da S. Sirqueira, P.C.G. da S. Vellasco, L.R.O. de Lima, A.T. da Silva, M.C. Rodrigues

17:45: Fatigue design of aluminium structures, C. Radlbeck, M. Rengstl, M. Mensinger

D-T2: Steel Structures, Steel Connections

10:30: On elastic buckling of bisymmetric H-section steel elements under bending and compression, M.A. Gizejowski, J. Uziak (Invited Paper)

11:00: Development of a new method for the direct numerical consideration of welding effects in the component design of welded plate girders, B. Launert, Z. Li, H. Pasternak

11:15: Behaviour of RHS X-joints having high brace-to-chord-width ratio under axial compression, C.H. Lee, S.H. Kim, J.H. Kim

11:30: Performance of welded flange plate joints between steel beams and box columns without continuity plates, M.A. Mahdavi-pour, S. Ding, D. Vysochinskiy

11:45: Estimation of rotation capacity of monosymmetric I-beams, I. Nanayakkara, C. Mallikarachchi, P. Dias

12:00: Testing and strengthening of funicular arched steel truss falsework, A.Y.A.A. El Sayed, M. Darwish, K. Nassar, O. Elkady, M. Hussein

12:15: Influence of steel brackets supporting crane runway girder structures on the stress distribution in the brackets, N. Korcz-Konkol, P. Iwicki, E. Urbańska-Galewska

D-T3: High Strength Steel, High Performance Steel

Special Session SS18: High Strength Steel in Research, Construction and Application

Organisers: Prof. Richard Stroetmann, Technical University of Dresden, Germany; Prof. Milan Veljkovic, Technical University of Delft, The Netherlands

13:30: Design and execution of welded connections at high-strength steels, R. Stroetmann, T. Kästner (Invited Paper)

14:00: Experimental investigation on the fatigue strength assessment of welded joints made of S1100 ultra-high-strength steel in as-welded and post-weld treated condition, A. Ahola, T. Skriko, T. Björk

14:15: Effects of residual stresses on fatigue crack initiation of butt-welded plates made of high strength steel, H. Xin, M. Veljkovic

14:30: Influence of residual stresses on the behaviour of flat and curved steel plates, J. Gomboši, S. Piculin, P. Može

14:45: Assessing the ultimate load capacity of plate-shaped and hollow-section steel components under tension using damage mechanics, S. Schaffrath, M. Feldmann

15:00: Stability design of high strength steel members, T. Tankova, L. Simões da Silva, T.Y. Tun

15:15: Experimental and numerical investigation on HSS stiffened curved plates, S. Piculin, D. Grigillo, P. Može

D-T4: High Strength Steel, High Performance Steel

Special Session SS18: High Strength Steel in Research, Construction and Application

Organisers: Prof. Richard Stroetmann, Technical University of Dresden, Germany; Prof. Milan Veljkovic, Technical University of Delft, The Netherlands

16:00: Material property characterization of advanced high strength cold-formed steel, Y. Xia, Z. Li, B.W. Schafer, H.B. Blum

16:15: Pre-tensioned UHS steel bracing system for CFS structures: Planning of research project, A. Campiche, S. Shakeel, R. Landolfo

16:30: Bearing behaviour of bolted connections in high strength steel, Y.B. Wang, Y.F. Lyu, G.Q. Li

16:45: Welded connections in innovative high strength steel constructions, J. Spiegler, U. Kuhlmann

17:00: Fatigue strength of high strength steel butt-welded connections, L.W. Tong, L.C. Niu, K. Si, L.W. Ai, M.L. Liu, X.L. Zhao

17:15: Experimental and numerical analyses of high-strength steel welds, R. Stroetmann, T. Kästner

D-W1: Steel Structures, Steel-Concrete Composite Construction

08:30: A hygro-thermo-chemical-mechanical model for the service response of composite steel-concrete floor systems, G. Ranzi, M. Bocciarelli (Invited Paper)

09:00: The study on structural characteristics for the steel-concrete composite slab using deformed flange T-shapes, T. Takasuka, T. Kumano, K. Sugiura

09:15: Bending and shear response of bonded steel sections, L.T. Chikore, M. Dundu

09:30: Column base connections subjected to axial compression and biaxial moments, R. Cloete, C. Roth

09:45: Artificial neural network prediction of bearing capacity of welded columns based on simplified welding simulations, Z. Li, B. Launert, H. Pasternak

10:00: Numerical validation of LRPH behaviour by FEM analysis, L. Palizzolo, S. Benfratello, P. Tabbuso, S. Vazzano

D-W2: Stability of Thin-Walled Sections

10:30: Complementary shear and transversal elongation modes in Generalized Beam Theory (GBT) for thin-walled circular cross-sections, M.J. Bianco, A.K. Habtemariam, C. Könke, F. Tartaglione, V. Zabel

10:45: Common criterion for structures critical states, J.B. Obrębski

11:00: On stability and load-bearing capacity of thin-walled composite profiles subjected to eccentric compression, H. Debski, S. Samborski

11:15: Thermal post-buckling behaviour of functionally graded plates with nonlinear temperature distribution, W. Xia, H.T. Yang, J.M. Wu, S.P. Shen

11:30: Stiffening strategies for perforated plate girders under shear loading, A. Jaramillo, N. Loaiza, C. Graciano, E. Casanova

11:45: Optical experimental investigations of thin-walled channel beams with non-standard flange, P. Paczos

12:00: Experimental investigation of distortional-lateral torsional buckling interaction of single channels restrained by angle cleats, G.M. Bukasa, M. Dundu

12:15: Main influences on the shape of failure of large-scale buckling tests under biaxial stresses, N. Maier, M. Mensinger, J. Ndogmo

D-W3: Cold-Formed Steel Structures

Special Session SS03: Cold-Formed Steel Systems and Components
Organiser: Prof. Kim Rasmussen, University of Sydney, Australia

13:30: Testing and analysis of shear connectors between cold-formed steel members and wood-based panels, P. Kyvelou, L. Gardner, D.A. Nethercot

13:45: Numerical modelling of prestressed composite cold-formed steel flooring systems, N. Hadjipantelis, P. Kyvelou, L. Gardner, M.A. Wadee

14:00: Stabilization effect on portal frames given by stressed-skin action of sandwich panels, Zs. Nagy, M. Nedelcu, A. Dező

14:15: Elastic buckling analysis of asymmetrically braced steel storage racks, Z. Huang, X. Zhao

14:30: Tests of cold-formed steel built-up open section beam-columns, Q.Y. Li, B. Young

14:45: Parametric study of cold formed steel joints using the component method, Zs. Nagy, A. Dező, A.A. Muresan

15:00: Behaviour of double-shear high strength steel bolted connections at elevated temperatures, Y.H. Cho, L.H. Teh, B. Young

15:15: Behaviour factor evaluation of CFS shear walls with gypsum board sheathing according to FEMA P695, S. Shakeel, A. Campiche, R. Landolfo

D-W4: Cold-formed Steel Sections, Lateral-Torsional Buckling

16:00: Load capacity of cold-formed column members of lipped channel cross-section with perforations subjected to compression loading, M.P. Kulatunga, M. Macdonald

16:15: Lipped cold-formed starred angles in compression, J.D.T. Nhokwara, M. Dundu

16:30: Effects of large displacements on the flexural-torsional buckling resistance of steel H-section beam-columns, M.A. Gizejowski, Z. Stachura, M.D. Gajewski, R.B. Szczerba

16:45: Numerical study of distortional-lateral torsional buckling interaction of single channels restrained by angle cleats, G.M. Bukasa, M. Dundu

17:00: On LTB predictions using equivalent geometric imperfection modelling, M.A. Gizejowski, Z. Stachura, M.D. Gajewski, R.B. Szczerba

17:15: On the lateral-torsional buckling of non-uniform C-beams, I. Mascolo, M. Modano, A. Amendola, F. Fraternali

STREAM E

E-M2: High Strength Concrete, High Performance Concrete, Fibre-Reinforced Concrete

Special Session SS06: Fatigue of Concrete in an Experimental-Virtual-Lab
Organisers: Prof. Steffen Anders, Bergische Universität Wuppertal, Germany; Prof. Ludger Lohaus, Leibniz Universität Hannover, Germany; Prof. Jörg Schröder, University of Duisburg-Essen, Germany

10:30: Experimental characterization of effective mechanical properties of micro-fractured high performance concrete, J. Sauer, J. Musialak, H. Steeb, M. Markert, V. Birtel, H. Garrecht

10:45: Microstructural analysis of crack growth caused by static and dynamic loads in a carbon fiber reinforced cement paste, M. Rutzen, D. Volkmer, U. Weiss, L. Reischmann, M.A. Peter, P. Lauff, O. Fischer, M. Raith, C. Grosse

11:00: DEM simulation and electron microscopy analysis of the fatigue behavior of ultra-high performance concrete, S. Rybczyński, M. Dosta, G. Schaan, M. Ritter, F. Schmidt-Döhl

11:15: Influence of fibre orientation on pull-out behaviour of PVA microfibre embedded in cement-based matrix under monotonic and cyclic loading, M. Ranjbarian, V. Mechtcherine, J. Storm, M. Kaliske

11:30: Numerical calibration of elasto-plastic phase-field modeling of fracture for experimental pullout tests of single steel fibres embedded in high-performance concrete, M. Pise, D. Brands, M. Sarhil, J. Schröder, G. Gebuhr, S. Anders

11:45: Deterioration development of steel fibre reinforced high performance concrete in low-cycle fatigue, G. Gebuhr, S. Anders, M. Pise, M. Sahril, D. Brands, J. Schröder

12:00: Analysis of load-induced temperature development in UHPC under cyclic compressive loading, N.L. Tran, M. Deutscher, S. Scheerer

12:15: Modelling of fibre-reinforced concrete by a fibre super-element overlay mesh, J. Storm, M. Kaliske, M. Ranjbarian, V. Mechtcherine

E-M3: High Strength Concrete, High Performance Concrete, Fibre-Reinforced Concrete

Incorporates Special Session SS06: Fatigue of Concrete in an Experimental-Virtual-Lab

Organisers: Prof. Steffen Anders, Bergische Universität Wuppertal, Germany; Prof. Ludger Lohaus, Leibniz Universität Hannover, Germany; Prof. Jörg Schröder, University of Duisburg-Essen, Germany

13:30: Experimental investigation of load-induced increase of temperature in UHPC, M. Deutscher, S. Scheerer, N.L. Tran

13:45: Pull-out behaviour of smooth steel microfibres embedded in UHPC, S. Höper, U. Kowalsky, D. Dinkler, J.-P. Lanwer, V. Oettel, M. Empelmann

14:00: Influence of aggregate morphological characteristics on the fracture resistance of high performance concrete, G. Basutkar, T. Leusmann, D. Lowke

14:15: Influence of water in the microstructure on the fatigue deterioration of high-strength concrete, C. Tomann, L. Lohaus

14:30: Acoustic emission due to fatigue damage mechanisms in high-strength concrete with different aggregates, T. Scheiden, N. Oneschkow, S. Löhnert, R. Patel

14:45: Flexural behaviour of polymer-based textile-reinforced concrete using basalt fibres, B. Çomak, E. Soliman, R. Chennareddy, M. Reda Taha

15:00: Cracking behaviour of carbon textile reinforced concrete members, R. El Ghadioui, N.L. Tran, T. Proske, C.A. Graubner

15:15: The influence of fibre orientation on the mechanical properties of cement composites, M. Mara, R. Lovichová, J. Fornusek

E-M4: High Strength Concrete, High Performance Concrete, Fibre-Reinforced Concrete

16:00: Numerical investigations on grouted segment joints for UHPC structures, H. Matz, M. Wichert, M. Empelmann

16:15: A multi-scale finite element analysis and sectional design approach for the creep of polymeric FRC, R. Vrijdaghs, L. Vandewalle, M. di Prisco

16:30: Implementing image analysis to assess the variability in flexural response of SFRC, T. Bosman, E.P. Kearsley

16:45: Steel fibre orientation by means of magnetic field, R. Lovichová, K. Takacova, J. Fornusek, M. Mara

17:00: Innovative applications of steel fibre reinforced concrete, M. Empelmann, J.-P. Lanwer

17:15: Numerical investigation on effects of steel fibers content on flexural behavior of UHPCC, M. Halimi, M. Kioumars, H. Bakhshi, H. Sarkardeh

E-T2: Reinforced & Prestressed Concrete Structures

10:30: Shear design of concrete bridge decks without shear reinforcement, G. Rombach, M. Harter, L. Henze (Invited Paper)

11:00: Probabilistic and semi-probabilistic design of large concrete beams failing in shear, L. Novák, D. Novák, R. Pukl

11:15: Resistance to diagonal tension cracking of single span prestressed girders, M.A. Roosen, C. van der Veen, D.A. Hordijk, M.A.N. Hendriks

11:30: Comparing Eurocode 2 prestress loss estimations to strains measured on a pretensioned bridge beam, T. Bosman, E.P. Kearsley, S.A. Skorpen, L.J. Butler, M.Z.E.B. Elshafie

11:45: Mechanical analysis of prestressed concrete curved bridges, H. Felix, J.Q. Lei, W.Q. Wang

12:00: Evaluation of shear capacity of prestressed concrete beams using the softened membrane model for prestressed concrete (SMM-PC), Y.R. Holebagilu, V.K. Polimeru, A. Laskar

12:15: Non-linear analysis of prestressed concrete T-beams, S.W.H. Ensink, C. v.d. Veen, M.A.N. Hendriks

E-T3: Reinforced Concrete Structures, Properties of Concrete, Pavement Design

13:30: Control of shrinkage cracking in reinforced concrete members with end restraint, R.I. Gilbert (Invited Paper)

14:00: Modelling of reinforced concrete structures subjected to cyclic loading, A.C. Ferche, F.J. Vecchio

14:15: Flexural behavior of concrete beams with PET reinforcement, J.O. Akinyele, C.M. Ogwumeh, U.T. Igba

14:30: Multi criteria analysis for the functional performance of surface pavement, A.A. Bawono, E. Caliskan, B. Lechner, Y. En-Hua

14:45: Thermo-mechanical material properties of concrete in the cooling phase, J. Lyzwa, J. Zehfuss

15:00: Recycling of cement stabilised gravel base material in a highway into aggregates for concrete, H. Fan, D. Shang, D. Han, B. Chen, Y. Wu, G. Liu, Q. Zhang, H. Li, Z. Sierens, B. Vandevyvere, J. Li

15:15: Study of finite element model on skid resistance for pavement made of engineered cementitious composite, A.A. Bawono, N. NguyenDinh, B. Lechner, Y. En-Hua

E-T4: Mechanics of Concrete, Properties of Concrete, Construction Materials

16:00: Mechanical strength and freeze-thaw resistance of fly ash alkaline-based mortars containing recycled aggregates submitted to accelerated carbonation, M. Mastali, Z. Abdollahnejad, F. Pacheco-Torgal

16:15: Using existing models and finite element analysis to predict the long-term deformation of lightweight foamed concrete, D.R. Do Amaral, A.S. van Rooyen

16:30: The use of PET pellets in cement stabilized compressed earth bricks, J.O. Akinyele, O.M. Akinwande, U.T. Igba

16:45: Cost and environmental performance of waste based alkali-activated mortars, Z. Abdollahnejad, M. Mastali, F. Pacheco-Torgal

17:00: Effect on concrete properties of mixing and curing with seawater: Compression and tension tests, P. van Tonder, N. Selepe, Z. Kunene, B. Lefifi, P. Munyai, A. Shumba, P.K. Mlangeni

17:15: Mechanical properties of fly ash alkaline-based mortars containing recycled aggregates and reinforced by hemp fibres submitted to accelerated carbonation, M. Mastali, Z. Abdollahnejad, F. Pacheco-Torgal

E-W1: Glass Structures, Cement-Based Materials

08:30: The effect of manufacturing flaws in the meso-structure of cast glass on the structural performance, T. Bristogianni, R. Nijse, F. Oikonomopoulou, F. Veer

08:45: Dry interlayers out of cast polyurethane rubber for interlocking cast glass structures: Experimental exploration and validation, F. Oikonomopoulou, F. Veer, T. Bristogianni, L. Barou

09:00: The glass swing: A vector active glass structure, A.H. Snijder, C. Louter, L. van der Linden, R. Nijse

09:15: Ground granulated blast-furnace and corex slag: Comparative study, S. Alaud

09:30: Effect of silicon carbide (SiC) nanoparticles on 3D printability of cement-based materials, M. van den Heever, F.A. Bester, P.J. Kruger, G.P.A.G van Zijl

09:45: Study of the impact of cement type used on selected physical and mechanical properties of aerated SCC concrete, K. Zieliński, P. Witkowski

E-W2: Masonry Structures

10:30: A semi-analytical approach to the evaluation of the local collapse mechanisms of masonry domes subject to seismic loads, F. Foti, A. Manzo, C. Chesi

10:45: Research into the effect of grouting on physical-mechanical properties of historic masonry, J. Witzany, R. Ziegler, T. Čejka, A. Maroušková, J. Kubát

11:00: Limiting structural damage on masonry structures due to foundation movement, J. Mahachi

11:15: Stiffness of unreinforced masonry walls subjected to static-cyclic shear, N. Mojsilović

11:30: Strength of materials and masonry structures in Malawi, P. Kloukinas, I. Kafodya, I. Ngoma, V. Novelli, J. Macdonald, K. Goda

11:45: Performance of confined masonry of 1953 during the 2014 Cephalonia Earthquake, F.V. Karantoni, S.J. Pantazopoulou

12:00: Form-finding for arches and vaults using the moment-step method, R.A. Bradley

E-W3: Timber Structures, Properties of Wood

*Incorporating Special Session SS21: Fracture Mechanics of Wood and Timber Structures
Organiser: Dr. Rostand Moutou Pitti, Université Clermont Auvergne, France*

13:30: Performance of above-ground-floor CLT wall systems and connections under monotonic loading, C. Hughes, D. McPolin, P. McGetrick, D. McCrum

13:45: Experimental investigation and numerical modelling of mechanical properties of CLTs, X. Li, M. Ashraf, M. Subhani, P. Kremer

14:00: Design and testing of pre-engineered prefabricated Casuarina wooden truss, A. Mahmoud, J. Said, S. Bader, M. Sayed, M. Fayez, O. Yacoub, P. Youssef, M. Darwish, K. Nassar, E.Y. Sayed-Ahmed, M.N. AbouZeid

14:15: Toward a quantitative evaluation of timber strength through on-site tests, A. Benedetti, M. Tarozzi

14:30: Comparative studies of three tropical wood species under compressive cyclic loading and various moisture content levels, A.C. Engonga Edzang, C.F. Pambou Nziengui, S. Ikogou, R. Moutou Pitti

14:45: Thermo-hygro-mechanical behaviour of notched beams of European species under creep loadings in outdoor conditions, M. Asseko Ella, C.F. Pambou Nziengui, S. Ikogou, R. Moutou Pitti

15:00: Mechanical characterization of tropical glued solid timber beams, C.H. Ndong Bidzo, R. Moutou Pitti, S. Ikogou, B. Kaiser

15:15: A database for spatial variability assessment of mechanical parameters of Ozigo specie under long-term bending tests in Gabon, V. Nsouami, E. Bastidas-Arteaga, R. Moutou-Pitti, N. Manfoumbi

15:30: The effect of moisture content on some mechanical properties of Casuarina wood, M. Hussein, K. Nassar, M. Darwish

STREAM F

F-M2: Structural Health Monitoring, Damage Detection, Long-Term Performance

Special Session SS02: Structural Health Monitoring and Damage Identification

Organisers: Prof. Maria Pina Limongelli, Politecnico di Milano, Italy; Prof. Guido De Roeck, University of Leuven, Belgium

10:30: Vibration-based structural health monitoring: Challenges and opportunities, M.P. Limongelli (Invited Paper)

11:00: On the use of kernel PCA for compensation of environmental effects on natural frequency estimates, C. Rainieri, E. Reynders

11:15: Structural identification of bridges using computer vision techniques, C.Z. Dong, F.N. Catbas

11:30: A numerical study of vibration-based scour detection in offshore monopile foundations, M. Samusev, M.D. Ulriksen, L. Damkilde

11:45: Initial curing monitoring of composite civil-engineering repairs and life-time embedded wave-based surveillance network, O.A. Bareille, M. Salvia, M. Ichchou, M. Zhang

12:00: Earth mass movements monitoring by means of fiber optics inclinometers and pattern recognition techniques, J. Sierra-Pérez, J. Alvarez-Montoya, J. Álvarez-Guerrero, J.S. Parra-Sánchez, F. Amaya-Fernández

12:15: On dependencies in value-of-information analysis for structural integrity management, K. Ali, J. Qin, M.H. Faber

12:30: Preliminary analysis of the dynamic behaviour of two strategic buildings subjected to the 2016 Central Italy earthquake, C. Iacovino, R. Ditommaso, F.C. Ponzio, M.P. Limongelli

12:45: Influence of damage and boundary conditions on the modal properties of unreinforced masonry infill walls in reinforced concrete frames, C. Rainieri, M. Di Domenico, P. Ricci, G. Fabbrocino, G.M. Verderame

F-M3: Structural Health Monitoring, Damage Detection, Long-Term Performance

Special Session SS12: Advances in Maintenance and Structural Health Monitoring of Bridges
Organisers: Prof. Chul-Woo Kim & Prof. Kunitomo Sugiura, Kyoto University, Japan

13:30: Damage experiment on a steel plate girder bridge and vibration-based damage detection, C.W. Kim, Y. Goi, T. Mimasu, M. Kawatani

13:45: Remote scour detection of a railway bridge utilizing ambient vibrations, S. Kitagawa, M. Shinoda, H. Yao, K. Yoshitome, C.W. Kim

14:00: Vibration monitoring and damage experiment on a prestressed concrete bridge, O.S. Luna Vera, Y. Kondo, C.W. Kim, Y. Oshima

14:15: Study on behaviour due to creep of cables in short and medium-size unstiffened suspension bridges, K. Ueno, T. Yamaguchi, H. Kaido

14:30: Analysis, visualization and monitoring of traffic-induced low frequency sound radiated from bridges, S. Kimura, K. Ono, R. Chen, C.W. Kim

14:45: An investigation on residual stress re-distribution and deformation of H-rolled beam end under partial volume loss process, T. Miyoshi

15:00: Influence of adhesive thickness on stress transfer between steel and CFRP plates, M. Takemura, K. Sugiura

15:15: Structural damage identification based on parameter identification using Monte Carlo method and likelihood estimation, T. Sato, L. Zhao, C. Wan

15:30: Investigations on relationship between the soundness of superstructure and the measured acceleration given by FWD system, H. Onishi

F-M4: Structural Health Monitoring, Maintenance, Damage Detection, Long-Term Performance

16:00: Impact of environmental based effects on SHM strategies, M. Baeßler, D. Bhuyan, F. Hille, E. Viefhues, M. Döhler, L. Mevel (Invited Paper)

16:30: Adaptive training of neural networks by a particle filter for prognosis of damaged structures, F. Cadini, C. Sbarufatti, M. Corbetta, M. Giglio

16:45: Damage detection in hyperbolic cooling towers using vibration-based damage detection techniques, S.M.C.M. Randiligama, D.P. Thambiratnam, T.H.T. Chan

17:00: Building information modelling in whole life management of reinforced concrete structures, Q. Jiang, J. Douglas, S.T. Yang

17:15: Durability assessment of non-steel reinforcement after more than ten years of service, A.F. Al-Khafaji, J.J. Myers

17:30: Embedded fibre-optic sensors in reinforced concrete beams, G.P. Cimellaro, M. Domaneschi, M. Morgese, F. Ansari, D. Inaudi

17:45: Corrosion resistance of carbon steel reinforcing bars: Cold gas spray treatment vs oil based solvent sprays, P. van Tonder, Z. Ndodana, N.W. Ngcobo

F-T2: Structural Assessment, Structural Health Monitoring, Maintenance

Incorporating Special Session SS20: Smart Maintenance and its Contribution to Sustainability in a Global Competitive Market. Organiser: Christian T. Geiss, ICON Services GmbH, Germany

10:30: Assessment of existing structures, M. Holicky, C. Viljoen, J.V. Retief (Invited Paper)

- 11:00:** Structural health monitoring as a tool for smart maintenance of wind turbines, M. Botz, M. Raith, A. Emiroglu, B. Wondra, C.U. Grosse
- 11:15:** Safety of infrastructures: A case study, M. Domaneschi, G.P. Cimellaro, A. Zona, M. Morgese, F. Ansari
- 11:30:** Standardized basis for assessment of existing structures, J.V. Retief, C. Viljoen, M. Holicky
- 11:45:** A concept for an integrated risk-based operation and maintenance strategy for wind turbines, C.T. Geiss, C.U. Grosse
- 12:00:** Damage assessment of concrete structures based on fractal dimension using nonlinear fracture mechanics cracks simulation, L.X. Pan, M.S. Cao, D. Novák, D. Lehký
- 12:15:** Conception of an interface for rotor blade inspections to semantic database for wind turbines, S. Obermeier, C. Geiss, C. Grosse

F-T3: Structural Applications of FRP Composites

Special Session SS08: Structural Applications of FRP Composites

Organisers: Prof. Lawrence Bank, Georgia Institute of Technology, USA; Prof. John Myers, Missouri University of Science and Technology, USA

- 13:30:** Structural analysis of FRP parts from waste wind turbine blades for building reuse applications, L.C. Bank, F.R. Arias, T.R. Gentry, T. Al-Haddad, B. Tasistro-Hart, J.F. Chen (Invited Paper)
- 14:00:** Flexural performance of extremely damaged reinforced concrete beams after SRP repair, H.H. Alghazali, Z.K. Al-Jaberi, Z.R. Aljazaeri, J.J. Myers
- 14:15:** Computational simulation of shear behaviour of scaled GFRP-reinforced concrete beams, F. Matta, S. Khodaie, M. Alnaggar
- 14:30:** Towards rational design approaches for FRP reinforced concrete structures in fire, M.F. Green, H. Hajiloo, A. Mousavi
- 14:45:** Seismic response of pultruded GFRP frame using Multi-Continuum Theory, L. Wang, E. Soliman, M.M. Reda Taha
- 15:00:** Review and assessment of various theories for modeling durability of GFRP reinforcement for concrete structures, B. Benmokrane, A.H. Ali
- 15:15:** Effect of different temperatures on epoxy adhesive used in near surface mounted FRP bars strengthened concrete masonry unit under direct shear test, Z.K. Al-Jaberi, J.J. Myers
- 15:30:** Recycling and reuse of carbon fibre reinforcement, F. Kopf, J. Kortmann, P. Jehle
- 15:45:** Shear behaviour of reinforced concrete beams with GFRP needles as coarse aggregate partial replacement: Full-scale experiments, X.F. Nie, B. Fu, J.G. Teng, L.C. Bank, Y. Tian

F-T4: Applications of FRP Composites; Monuments & Historic Structures

- 16:00:** Bond between FRP bars and fine-grain high-performance concrete with CFRP mesh confinement, K. Holschemacher, H. Zhong
- 16:15:** Shear capacity of BFRP reinforced concrete beams without shear reinforcement, S. Hofmann, N.L. Tran, T. Proske, C.A. Graubner
- 16:30:** F-RCM bundle as connection in multiple leaf masonry: Experimental investigation, L. Anania
- 16:45:** Large-scale contact analysis for the stability estimation of the Mnajdra monuments, S.M. Motsa, G.A. Drosopoulos, M. Stavroulaki, G. Stavroulakis, R.P. Borg, P. Galea, S. d'Amico

17:00: Rehabilitation of a historic building in Egypt: King Farouk Rest House, R. Abdelmaksoud, S. Abdellatif, A. Aboulela, M. El Tawil, O. Rizk, A. Sefein, O. El Kadi, M.N. Abou-Zeid, S. Khedr, E.Y. Sayed-Ahmed

17:15: Assessment of historical steel bridges, P. Ryjáček

17:30: Historical reinforced concrete arch bridges of Songavazzo and Brivio (Italy): Dynamic identification and seismic vulnerability assessment, M. Acito, C. Chesi, A. Jain

F-W1: Collapse Behaviour of Structures, Failure Analysis

08:30: Progressive collapse of structures: Review and outlook, U. Starossek (Invited Paper)

09:00: The anatomy of a collapse: Forensic analyses, monitoring and restoration attempts of the Fossano Bridge, F. Bazzucchi, G.A. Ferro

09:15: Demolition engineering: Determination of the axial load capacity of steel columns weakened by horizontal and diagonal cuts, T.P.A. Dunn, R.S. Walls

09:30: A numerical study on the collapse of a precast industrial building, P. Bamonte, M.G. Mulas, E. Nuzzi, D. Siciliano

09:45: Demolition engineering: Lateral load carrying capacity of weakened steel beams, D. Mitchell, R.S. Walls

10:00: Structural failure analysis and proposed remedies for underground mining tunnels in Third World Countries, H.J. Mtyana

F-W2: Structural Assessment, Repair, Strengthening, Retrofitting

10:30: Seismic vulnerability assessment of Italian masonry churches at territorial scale, G. De Matteis, V. Corlito (Invited Paper)

11:00: BIM-based approach for seismic vulnerability analysis: A case study, G.P. Cimellaro, M. Domaneschi, V. Villa, A. Zamani Noori, M.V. Pietropinto, A. Cardoni, S. Marasco

11:15: Application of carbon fibre composite materials for the rehabilitation of fatigue damaged steel structures, Y. Kasper, M. Albiez, T. Ummenhofer, Y. Ciupack, L. Ledecy, H. Pasternak, A. Geßler, M. Feldmann

11:30: Dynamic performance of steel plate-strengthened reinforced concrete slabs in bending, A.M. Olajumoke, M. Dundu

11:45: Shear tension resistance of prestressed girders with a low stirrup ratio, M.A. Roosen, C. van der Veen, D.A. Hordijk, M.A.N. Hendriks

12:00: Influence of no-longer-permitted stirrup types on the shear capacity: Experimental investigations on prestressed continuous beam subsystems, N. Schramm, O. Fischer

12:15: Seismic behaviour of irregular RC frames damaged by corrosion, S. Imperatore, M. Kioumars

12:30: Steel contribution effect of pre-cracked RC beams bonded with steel plates, S.D. Ngidi, M. Dundu

12:45: Comparison between strengthening of reinforced concrete beams using steel plates and double FRCM layers, D. Khouzam, N. Hanna, A. el Nemr, E. Khattab

F-W3: Foundations, Soil-Structure Interaction, Soil Mechanics

13:30: On the design of monopile foundations for monotonic and cyclic loading, M. Achmus (Invited Paper)

14:00: Investigation of the soil structure interaction of integral bridges, J. Grabe, P. Vogel, G. Rombach

14:15: A contribution to a new bearing capacity equation in cohesionless soil, S. Krabbenhoft, L. Damkilde, K. Krabbenhoft

14:30: Decreasing computational cost of a slope stability analysis by differential evolution accelerated particle swarm optimization, R. van der Meij, J.P. Kwekkeboom

14:45: Porous concrete in secant pile walls, M. Pulsfort, M. Herten, C. Fierenkothen

F-W4: Underground Structures, Geotechnical Engineering, Bio-Soil Engineering

16:00: The behaviour during construction of an existing tunnel that lies between two large vertically parallel shield tunnels adjacent to each other, N. Horichi, L.F. Boswell, S. Chang, Y. Oku

16:15: Case study of a rock slope failure and remediation, Z. Cabarkapa

16:30: Design of railway embankment using the Mohr Coulomb criterion and GSK model for cohesionless soil, S. Krabbenhoft, R. Christensen

16:45: Incorporating the particularities of soil and water bioengineering works into a design methodology with monitoring feedback loops, G. Tardio, S.B. Mickovski, P. Sangalli

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