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EACS 2016 Conference Program

University of Sheffield

11th-13th July 2016



Conference Schedule Overview

Sunday 10th July:

Early registration in the diamond foyer 15.00-17.00

	Monday July 11th	Tuesday July 12th	Wednesday July 13th
8.00-17.00	Registration desk open - Diamond foyer		
8.30-9.00	Welcome - light refreshments		
9.00-10.00	Diamond LT3 Keynote: M. Todd	Diamond LT3 Keynote: A. Preumont	Diamond LT3 Keynote: P. Reynolds
10.00-10.30	N/A	N/A	N/A
10.30-10.50	Coffee Break - Diamond basement		
10.50-11.10	Control 1 (Chair: F Casciati)	Civil SHM (Chair: J Brownjohn)	Active and semi active control (Chair: M Zilletti)
11.10-11.30	Smart materials (Chair: O Ganilova)	Earthquake 2 (Chair: V Gattulli)	Inerters (Chair: J Holnicki-Szulc)
11.30-11.50			
11.50-12.10			
12.10-13.40	Lunch Buffet - Diamond basement		
13.40-14.00			
14.00-14.20	Control 2 (Chair: J Rodellar)	SHM 2 (Chair: N. Dervilis)	Damping (Chair: J. Rongong)
14.20-14.40	Earthquake 1 (Chair: C Lord)	Earthquake 3 (Chair: A. Giaralis)	Inerters/Active TMD (Chair: S Neild)
14.40-15.00			
15.00-15.20	Coffee Break - Diamond basement		
15.20-16.00			
16.00-16.20	SHM 1 (Chair: C Sbarrufatti)	Hybrid testing (Chair: O Bursi & N Tondini)	Diamond tours
16.20-16.40	Tuned mass dampers (Chair: I Lazar)	System ID and nonlinear systems (Chair: J Mottershead)	
16.40-17.00			
17.00-17.20	Drinks reception - Diamond basement		
Evening	Conference Dinner - Cutlers Hall		
	Conference Close		

Monday 11th July

Plenary Talk, Monday 11th July, 9.00 – 10.00 Location: Lecture Theatre 3, Diamond Building

The Synergy Between Structural Health Monitoring (SHM) and Control: Can SHM Be Cast as a Controls Problem?

Michael Todd

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Structural health monitoring (SHM) is the general process of making an assessment, based on appropriate analyses of in-situ measured data, about the current ability of a structural component or system to perform its intended design function(s) successfully. Damage prognosis (DP) extends this process by considering how the SHM state assessment, when combined with probabilistic future loading and failure mode models with relevant sources of uncertainty adequately quantified, may be used to forecast remaining useful life (RUL) or similar performance-level variables in a way that facilitates efficient life cycle management and possibly even suggest mitigation strategies. A successful SHM/DP strategy may enable significant ownership cost reduction through maintenance optimization, performance maximization during operation, and unscheduled downtime minimization, and/or enable significant life safety advantage through catastrophic failure mitigation.

In broad terms, any SHM/DP strategy inevitably must, for a well-defined application, include in-situ data acquisition, feature extraction from the acquired data, statistical modeling of the features, and classification of the features to make risk-informed decisions; the ultimate global goal of SHM/DP systems is to direct economically efficient and/or safety-maximized structural health decision-making for the general purpose of long-term effective life cycle management and damage mitigation. One such paradigmatic approach that integrates these elements is Bayesian experimental design, which that facilitates the design of such a strategy in four steps: (1) Evaluation of the design space including constraints, (2) Extraction of relevant candidate features and modeling their variability as a function of free design variables, (3) Derivation of a detector, and (4) Evaluation of detector performance. This presentation will present this new paradigmatic approach and explore its suitability as being cast as a form of a controls/optimization problem involving plant/state definition, constraints, and feedback.

Control 1		
Location: Lecture Theatre 3, Diamond Building Session Chair: F. Casciati		
Monday 11th July		
Time		Paper #
10.30	<p style="text-align: center;">Fault Tolerant Control Design of Floating Offshore Wind Turbines</p> <p style="text-align: center;">Rodellar, J., Tutivén, C., Acho, L, Vidal, Y</p> <p style="text-align: center;"><i>Universitat Politècnica de Catalunya, Barcelona College of Industrial Engineering, Control Dynamics and Applications Research Group, Comte d'Urgell, 187, Barcelona 08036, Spain</i></p>	160
10.50	<p style="text-align: center;">Manageable Reactor Pressure Vessel Materials Control Surveillance Programme</p> <p style="text-align: center;">Krasikov E. A.</p> <p style="text-align: center;"><i>National Research Centre «Kurchatov Institute», 1, Kurchatov sq., 123182 Moscow, Russia</i></p>	104
11.10	<p style="text-align: center;">MIMO control design including input-output frequency weighting for human-induced vibrations</p> <p style="text-align: center;">Xidong Wang*¹, Iván M. Díaz¹, Emiliano Pereira²</p> <p style="text-align: center;">¹<i>Universidad Politécnica de Madrid, E.T.S. Ingenieros de Caminos, Canales y Puertos, 28040, Madrid, Spain</i></p> <p style="text-align: center;">²<i>Universidad de Alcalá de Henares, Escuela Politécnica Superior, 28805, Alcalá de Henares (Madrid), Spain</i></p>	106
11.30	<p style="text-align: center;">Real Time Control of Shake Tables for Nonlinear Hysteretic Systems</p> <p style="text-align: center;">Ki P. Ryu, Andrei M. Reinhorn</p> <p style="text-align: center;"><i>University at Buffalo, State University of New York, USA</i></p>	110
11.50	<p style="text-align: center;">Mitigation of the structure response based on inertial shock-absorber</p> <p style="text-align: center;">Rami Faraj¹, Jan Holnicki-Szulc¹, Lech Knap², Jarosław Seńko²</p> <p style="text-align: center;">¹<i>Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland</i></p> <p style="text-align: center;">²<i>Warsaw University of Technology, Faculty of Automotive and Construction Machinery Engineering, Poland</i></p>	138

Control 2		
Location: Lecture Theatre 3, Diamond Building Session Chair: J. Rodellar		
Monday 11th July		
Time		Paper #
13.40	<p style="text-align: center;">Receptance based approach for control of floor vibrations</p> <p style="text-align: center;">Donald Steve Nyawako¹, Maryam Ghandchi Tehrani², Paul Reynolds¹</p>	139

	<p>¹<i>Vibration Engineering Section, College of Engineering, Mathematics and Physical Sciences, University of Exeter, North Park Road, Exeter, EX4 4QF, UK.</i></p> <p>²<i>Institute of Sound and Vibration Research, University of Southampton, Highfield, Southampton, SO17 1BJ, UK.</i></p>	
14.00	<p>Passive driving of the waves induced by a helicopter land-crash</p> <p>Fabio Casciati¹, Sara Casciati² and Lucia Faravelli¹</p> <p>¹<i>DICAR / University of Pavia/ via Ferrata 3, 27100 Pavia, Italy</i></p> <p>²<i>DICAR/University of Catania/ piazza Federico di Svevia, 96100, Siracusa, Italy</i></p>	141
14.20	<p>Use of overturning spectra in the performance evaluation of on-off control strategies for rocking objects</p> <p>Rosario Ceravolo¹, Marica Pecorelli¹, Luca Zanotti Fragonara²</p> <p>¹<i>Politecnico di Torino, Department of Structural, Building and Geotechnical Engineering, Corso Duca degli Abruzzi, 24 -10129 Turin, Italy</i></p> <p>²<i>Cranfield University, School of Aerospace, Transportation and Manufacturing, College Road, Cranfield, MK43 0AL, United Kingdom</i></p>	145
14.40	<p>Control Strategies for an Underwater Geotechnical Drilling System</p> <p>Aldo G. Arriaga¹, Marcos Arroyo², Norma Pérez¹, Marcelo Devincenzi¹</p> <p>¹<i>Igeotest, Borrassà w/n 17600 Figueres, Girona, Spain</i></p> <p>²<i>Department of Civil Engineering and Geosciences, Division of Geotechnical Engineering, UPC, Barcelona, Spain</i></p>	180
15.00	<p>Revealing of the Wave-Like Process in Kinetics of the Reactor Pressure Vessel Steel Radiation Degradation</p> <p>Krasikov E. A.</p> <p><i>National Research Centre «Kurchatov Institute», 1, Kurchatov sq., 123182 Moscow, Russia</i></p>	103

<p>SHM 1</p> <p>Location: Lecture Theatre 3, Diamond Building</p> <p>Session Chair: C. Sbarufatti</p>		
<p>Monday 11th July</p>		
Time		Paper #
16.00	<p>Recent Advances on Pseudodynamic Hybrid Simulation of Masonry Structures</p> <p>G. Abbiati¹, G. Miraglia², B. Stojadinovic¹</p> <p>¹<i>Department of Civil, Environmental and Geomatic Engineering (D-BAUG), IBK, ETH Zurich,</i></p>	111

	<i>Switzerland</i>	
	²Department of Structural, Geotechnical and Building Engineering (DISEG), Polytechnic of Turin, Italy	
16.20	<p>Model-based fatigue prognosis of fiber-reinforced laminates exhibiting concurrent damage mechanisms</p> <p>M. Corbetta¹, C. Sbarufatti¹, M. Giglio¹, A. Saxena², K. Goebel³</p> <p>¹<i>Politecnico di Milano, Dipartimento di Meccanica, via La Masa 1, Milan 20156, Italy.</i></p> <p>²<i>General Electric Global Research, 2623 Camino Ramon Suite 500, San Ramon, CA 94583.</i></p> <p>³<i>NASA Ames Research Center, Intelligent Systems Division, MS 269-4, Moffett Field, CA 94035.</i></p>	128
16.40	<p style="text-align: center;">On Correlation and Causality in Structural Dynamics</p> <p style="text-align: center;">E.J. Cross and K. Worden</p> <p style="text-align: center;"><i>Dynamics Research Group, University of Sheffield, UK</i></p>	167
17.00	<p>Damage Identification Research of Spatial Structure using wavelet packet energy method Based on Dynamic Strain</p> <p style="text-align: center;">Li XU , Jiaqi KUANG</p> <p style="text-align: center;"><i>Earthquake Engineering Research & Test Centre, Guangzhou University, Guangzhou 510405, China</i></p>	152

Special Session: Smart Materials		
Location: Lecture Theatre 4, Diamond Building		
Session Chair: O. Ganiilova		
Monday 11th July		
Time		Paper #
10.30	<p>Vibration Response and Damping Behaviour in Sandwich Composites with Magnetorheological Elastomer Core</p> <p style="text-align: center;">Pooja Sharma and Nagendra Gopal, K.V.</p> <p style="text-align: center;"><i>Department of Aerospace Engineering, Indian Institute of Technology Madras, Chennai, India</i></p>	119
10.50	<p>Semi-active Vibration Control Using Piezoelectric PZT Composite Films</p> <p style="text-align: center;">O. Altay¹, R. Wunderlich², S. Klinkel¹</p> <p style="text-align: center;">¹<i>RWTH Aachen University, Faculty of Civil Engineering</i></p> <p style="text-align: center;">²<i>RWTH Aachen University, Faculty of Electrical Engineering and Information Technology</i></p>	124
11.10	<p>Optimal Tuning Of Shunt Parameters For Lateral Beam Vibration Attenuation With Three Collocated Piezoelectric Stack Transducers</p> <p style="text-align: center;">Benedict Götz¹, Oliver Heuss², Roland Platz² & Tobias Melz¹</p>	149

	<p>¹<i>Technische Universität Darmstadt, System Reliability and Machine Acoustics SzM, Magdalenenstrasse 4, D-64289, Darmstadt, Germany</i></p> <p>²<i>Fraunhofer Institute for Structural Durability and System Reliability LBF, Bartningstrasse 47, D-64289, Darmstadt, Germany</i></p>	
11.30	<p>Fuzzy Control of Three-Degree-of-Freedom Systems using Multiple MR Dampers</p> <p>Omar M. M. Elmeligy, Maguid H.M. Hassan</p> <p><i>The British University in Egypt (BUE)</i></p>	115
11.50	<p>Energy Harvesting based on the Hybridisation of two Smart Materials</p> <p>Julian S. Gosliga, Dr Olga A. Ganilova</p> <p><i>Dynamics Research Group, Department of Mechanical Engineering, University of Sheffield, Mappin Street, Sheffield, S1 3JD, UK</i></p>	170

<p>Earthquake 1</p> <p>Location: Lecture Theatre 4, Diamond Building</p> <p>Session Chair: C. Lord</p>		
<p>Monday 11th July</p>		
Time		Paper #
13.40	<p>Seismic response of high-strength steel moment connections used in special moment frames</p> <p>Cheng-Chih Chen, Chung-Yao Hsueh, Miao Wang</p> <p><i>Department of Civil Eng., National Chiao Tung University, Taiwan</i></p>	165
14.00	<p>Control of structures subjected to earthquake excitation based on non resonance theory</p> <p>Nikos G. Pnevmatikos¹, George A. Papagiannopoulos², George Hatzigeorgiou³</p> <p>¹<i>Technological Educational Institution of Athens, Department of Civil Engineering, Surveying and Geoinformatics, Ag. Spyridonos Str., P.O. 12210 Egaleo-Athens, Greece</i></p> <p>²<i>Department of Civil Engineering, University of Patras, GR-26500 Patras, Greece.</i></p> <p>³<i>Hellenic Open University, School of Science and Technology, Parodos Aristotelous 18, GR-26335, Patras, Greece.</i></p>	112
14.20	<p>A Practical Design Method for Seismic Strengthening of RC Frames Using Friction-Based Passive Energy Dissipation Devices</p> <p>Neda Nabid, Iman Hajirasouliha, Mihail Petkovski</p> <p><i>Department of Civil and Structural Engineering, The University of Sheffield, Sheffield, UK</i></p>	120
14.40	<p>Dynamic Behaviour of a Seven-Storey Seismically Isolated Building during the 2011 Tohoku Earthquake</p>	127

	Toshihide Kashima <i>Building Research Institute, Japan</i>	
15.00	<p style="text-align: center;">Development of Adaptive Rubber Bearings</p> <p style="text-align: center;">C. S. Tsai¹, H. C. Su², W. C. Huang¹, T. C. Chiang³</p> <p style="text-align: center;">¹<i>Department of Civil Engineering, Feng Chia University, Taichung, Taiwan</i></p> <p style="text-align: center;">²<i>Department of Water Resources Engineering and Conservation, Feng Chia University, Taichung, Taiwan</i></p> <p style="text-align: center;">³<i>Earthquake Proof Systems, Inc., Taichung, Taiwan</i></p>	134

Tuned Mass Dampers		
Location: Lecture Theatre 4, Diamond Building		
Session Chair: I. Lazar		
Monday 11th July		
Time		Paper #
16.00	<p style="text-align: center;">Optimal Design And Practical Implementation Of Eddy-Current Tuned Mass Dampers with Permanent Magnets For Multi-Storey Buildings</p> <p style="text-align: center;">Álvaro Magdaleno¹, Emiliano Pereira², Javier Castaño³, Norberto Ibán³, Iván M. Díaz⁴ & Antolín Lorenzana,¹</p> <p style="text-align: center;">¹<i>ITAP, EII, Universidad de Valladolid, 47011, Valladolid, Spain</i></p> <p style="text-align: center;">²<i>EPS, Universidad de Alcalá, 28805, Alcalá de Henares (Madrid), Spain</i></p> <p style="text-align: center;">³<i>Centro Tecnológico CARTIF, 47151, Boecillo (Valladolid), Spain</i></p> <p style="text-align: center;">⁴<i>ETSICCP, Universidad Politécnica de Madrid, 28040, Madrid, Spain</i></p>	174
16.20	<p style="text-align: center;">Application and Testing of Hybrid Mass Dampers for Vibration Control of Canton Tower</p> <p style="text-align: center;">Ping Tan, Yanhui Liu, Fulin Zhou, Shi Huan</p> <p style="text-align: center;"><i>Earthquake Engineering Research & Test Center, Guangzhou University, Guangzhou, 510405, P.R. China</i></p>	171
16.40	<p style="text-align: center;">Simulation of the response of a lively footbridge under pedestrian loading with two tuned mass dampers for its two first modes (2.1Hz and 2.5Hz)</p> <p style="text-align: center;">Norberto Ibán¹, Javier Castaño¹, Álvaro Magdaleno², Mariano Cacho², Alberto Fraile³, Antolín Lorenzana²</p> <p style="text-align: center;">¹<i>Fundación CARTIF, Parque Tecnológico de Boecillo, Boecillo (Valladolid), Spain</i></p> <p style="text-align: center;">²<i>ITAP. EII. Universidad de Valladolid, Valladolid, Spain</i></p> <p style="text-align: center;">³<i>UPM, Escuela Técnica Superior de Ingenieros Industriales, Madrid, Spain</i></p>	182
17.00	<p style="text-align: center;">Feasibility Of Viscous Mass Damper With Bingham Fluid Origened Force Restriction Mechanism For Base-Isolated Structure</p> <p style="text-align: center;">Masahiro IKENAGA¹, Kohju IKAGO² and Norio INOUE¹</p> <p style="text-align: center;">¹<i>Dept. of Architecture and Building Science, Graduate School of Eng., Tohoku</i></p>	144

	University, Dr. Eng.	
	² International Research Institute of Disaster Science, Tohoku Univ. Dr. Eng.	

Tuesday 12th July

Plenary Talk, Tuesday 12th July, 9.00 – 10.00 Location: Lecture Theatre 3, Diamond Building

Vibration control of large civil engineering structures

André Preumont

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Large civil engineering structures are sensitive to vibrations due to various excitation sources such as earthquakes, wind, traffic or pedestrians. These vibrations may induce a catastrophic failure of the structure as in the case of earthquake or flutter instability (e.g. Tacoma bridge), or they can affect the comfort of the occupants (e.g. wind induced sway of high rise buildings). They may result from a fairly complicated interaction between the structural motion and its environment which necessitates multiphysics tools for their analysis (e.g. in flutter, the structural vibration is the source of unsteady aerodynamic forces). In other cases, they result from the nonlinear behaviour of the structure itself (e.g. parametric excitation of stay cables due to the deck motion of cable-stayed bridges). In some circumstances, pedestrian bridges may be subjected to the phenomenon of synchronization according to which the bridge motion induces the crowd marching on the bridge to synchronize their steps (it was the case in the Millennium bridge in London on the inauguration day). Large bridges are often more sensitive during the construction phase. As the structures tend to become ever larger with time and metallic structures have very little damping, vibration phenomena tend to become more and more important and necessitate special engineering devices to mitigate them and reduce the resonance peaks. Because of their size and the requirements in terms of reliability and serviceability, the actuators play a critical role in the active control loop.

This paper reviews various vibration mechanisms and various vibration control devices which have been used successfully (mostly in the Far-East), and explores some new applications where vibration control could be applied successfully.

Special Session: Civil SHM

Location: Lecture Theatre 3, Diamond Building

Session Chair: J. Brownjohn

Tuesday 12th July

Time		Paper #
10.30	<p>Advanced Methodologies and Techniques for Monuments Preservation: the Trajan Arch in Benevento as a Case of Study</p> <p>Luigi Petti¹, Fabrizio Barone², Angelo Mammone¹, Gerardo Giordano³, A.Di Buono¹</p> <p>¹ <i>University of Salerno, Dept. of Civil Engineering, Via Giovanni Paolo II, 132, I-84084 Fisciano.</i></p> <p>² <i>University of Salerno, Dept. of Medicine and Surgery, Via S. Allende, I-84081 Baronissi (SA).</i></p> <p>³ <i>University of Salerno, Via S. Allende, I-84081 Baronissi (SA).</i></p>	125
10.50	<p>HIL model and cable stayed footbridge monitoring/control</p> <p>Fabio Casciati¹, Sara Casciati², Lucia Faravelli¹</p> <p>¹ <i>DICAR / University of Pavia/ via Ferrata 3, 27100 Pavia, Italy</i></p> <p>² <i>DICAR/University of Catania/ piazza Federico di Svevia, 96100 Pavia, Italy</i></p>	140
11.10	<p>Improving Emergency Response Using Wearable Wireless Sensor Networks and Structural Health Monitoring Systems</p> <p>Sheikhi, E.¹, Cimellaro, G.P.² & Mahin, S.³</p> <p>¹<i>Department of Control and Computer Engineering (DAUIN), Politecnico di Torino, Italy</i></p> <p>²<i>Department of Structural, Building and Geotechnical Eng. (DISEG), Politecnico di Torino, Italy</i></p> <p>³<i>Department of Civil and Environmental Engineering, University of California Berkeley, USA</i></p>	158
11.30	<p>A new approach to identification of cracks in beams and experimental verification</p> <p>Chuanchuan Hou, Yong Lu</p> <p><i>Institute for Infrastructure and Environment, School of Engineering, the University of Edinburgh, Edinburgh EH9 3JL, UK</i></p>	168
11.50	<p>Viability of optical tracking systems for monitoring deformations of a long span bridge</p> <p>James Brownjohn¹, David Hester², Yan Xu¹ Bassitt J¹, Koo K-Y¹</p> <p>¹ <i>University of Exeter</i></p> <p>² <i>Queen's University Belfast</i></p>	172

SHM 2

Location: Lecture Theatre 3, Diamond Building

Session Chair: N. Dervilis

Tuesday 12th July

Time		Paper #
13.40	<p>Sensor Selection Based On Principal Component Analysis For Fault Detection In Wind Turbines</p> <p>Pozo, F. & Vidal, Y</p> <p><i>Control, Dynamics and Applications (CoDALab), Department of Mathematics, Escola Universit`aria d'Enginyeria T`ecnica Industrial de Barcelona (EUETIB), Universitat Polit`ecnica de Catalunya (UPC), Comte d'Urgell, 187, 08036 Barcelona, Spain</i></p>	175
14.00	<p>Quantification Of Uncertainty For Experimentally Obtained Modal Parameters In The Creation Of A Robust Damage Model</p> <p>Gardner, P, Barthorpe, R & Lord, C</p> <p><i>Dynamics Research Group, Department of Mechanical Engineering, University of Sheffield, Mappin Street, Sheffield, UK, S1 3JD</i></p>	191
14.20	<p>Design criteria for structural monitoring system: a preliminary approach</p> <p>V. Gattulli¹, F. Potenza¹, F.J. Baeza²</p> <p><i>¹Dep. of Civil, Architectural and Environmental Engineering, University of L'Aquila, Italy</i></p> <p><i>²Dep. of Civil Engineering, University of Alicante, Spain</i></p>	197
14.40	<p>Tool wear state clustering in milling based on recorded acoustic emission</p> <p>N. Ray¹, E.J. Cross¹, K. Worden¹, S. Turner² and J.P. Villain-Chastre³</p> <p><i>¹ Dynamics Research Group, Department of Mechanical Engineering, University of Sheffield, Mappin Street, Sheffield, UK, S1 3JD</i></p> <p><i>²AMRC, University of Sheffield</i></p> <p><i>³Messier-Bugatti-Dowty</i></p>	201
15.00	<p>Features of Nonlinear Vibration-Based Structural Health Monitoring</p> <p>Mohamed S. Eid¹, Ayman H. H. Khalil²</p> <p><i>¹ STRUCTURE International Consultancy Centre, Abu Dhabi, United Arab Emirates</i></p> <p><i>² Structural Engineering Department, Faculty of Engineering, Ain Shams University, Cairo, Egypt</i></p>	193

Special Session: Hybrid Testing

Location: Lecture Theatre 3, Diamond Building

Session Chair: O Bursi & N Tondini

Tuesday 12th July

Time		Paper #
16.00	<p>Hybrid simulation applied to fire testing: a newly conceived partitioned static solver</p> <p>Nicola Tondini¹, Giuseppe Abbiati², Luca Possidente¹ and Bozidar Stojadinovic²</p> <p>¹<i>Department of Civil, Environmental and Mechanical Engineering, University of Trento, Via Mesiano, 38123, Trento, Italy</i></p> <p>²<i>Department of Civil, Environmental and Geomatic Engineering (D-BAUG), IBK, ETH Zurich, WolfgangPauli-Strasse 27, Switzerland</i></p>	121
16.20	<p>A comparison of online and offline experimental substructuring methods for the simulation of complex linear dynamic systems.</p> <p>Oreste S. Bursi¹, Vincenzo La Salandra¹, Giuseppe Abbiati², Luca Caracoglia³</p> <p>¹<i>Department of Civil, Environmental and Mechanical Engineering, University of Trento, Trento, Italy.</i></p> <p>²<i>Department of Civil, Environmental and Geomatic Engineering (D-BAUG), IBK, ETH Zurich, Switzerland.</i></p> <p>³<i>Department of Civil and Environmental Engineering, Northeastern University, Boston, Massachusetts, 02115 USA.</i></p>	122
16.40	<p>A Novel Methodology for Hybrid Fire Testing</p> <p>Ana Sauca¹, Thomas Gernay¹, Fabienne Robert², Nicola Tondini³, Jean-Marc Franssen¹</p> <p>¹<i>University of Liege, Department ArGEnCo, Liege, Belgium</i></p> <p>²<i>CERIB, Fire Testing Center, Epernon, France</i></p> <p>³<i>University of Trento, Department of Civil, Environmental and Mechanical Engineering, Italy</i></p>	132
17.00	<p>A Pseudodynamic Testing Algorithm for Obtaining Seismic Responses of Structures</p> <p>Shuenn-Yih Chang¹, Chiu-Li Huang²</p> <p>¹<i>National Taipei University of Technology</i></p> <p>²<i>Fu Jen Catholic University</i></p>	135

Earthquake 2

Location: Lecture Theatre 4, Diamond Building

Session Chair: V. Gattulli

Tuesday 12th July

Time		Paper #
10.30	<p>Networked Overlapping Control For Building Benchmark</p> <p>Bakule, L., Papík, M. & Reháč, B.</p> <p><i>Institute of Information Theory and Automation, Czech Academy of Sciences, 182 08 Prague, Czech Republic</i></p>	142
10.50	<p>Seismic test of building floor isolation using polynomial friction pendulum isolators</p> <p>Lyan-Ywan Lu¹, Liang-Wei Wang¹, Chun-Chung Tsai²</p> <p>¹ <i>Department of Civil Engineering, National Cheng Kung University, 1 University Road, Tainan 701, Taiwan</i></p> <p>² <i>National Kaohsiung First University of Science and Technology, Kaohsiung, Taiwan</i></p>	143
11.10	<p>Modelling the Response of Isolation Rubber Bearings with Variable Axial Loading</p> <p>M. Domaneschi¹, L. Martinelli¹, C. Cattivelli²</p> <p>¹<i>Department of Civil and Environmental Engineering, Politecnico di Milano, Milan, Italy</i></p> <p>² <i>Politecnico di Milano</i></p>	147
11.30	<p>Experimental Study Of The Effectiveness Of Semi-Actively Implemented Power-Law Damping On Suppressing The Seismic Response Of A Base-Isolated Building</p> <p>Maki DAN¹, Masashi OMURA¹, Fumito NAKAMICHI¹, Masayuki KOHIYAMA¹, & Zi-Qiang LANG²</p> <p>¹<i>Graduate School of Science and Technology, Keio University, Hiyoshi 3-14-1, Kohoku-ku, Yokohama-shi, Kanagawa, Japan</i></p> <p>²<i>Department of Automatic Control and Systems Engineering, The University of Sheffield, Mappin Street, Sheffield, United Kingdom</i></p>	155
11.50	<p>Application of Crescent-Shaped Brace passive resisting system in multi-storey frame structures</p> <p>Omar Kammouh¹, Stefano Silvestri², Michele Palermo², Gian Paolo Cimellaro¹,</p> <p>¹<i>Politecnico di Torino</i></p> <p>²<i>University of Bologna</i></p>	157

Earthquake 3

Location: Lecture Theatre 4, Diamond Building

Session Chair: A. Giaralis

Tuesday 12th July

Time		Paper #
13.40	<p>Modelling the Axial Response of the Roll-N-Cage Device for Seismic Isolation</p> <p>M. Colombo¹, M. Domaneschi¹, M. Ismail², L. Martinelli¹, J. Rodellar³</p> <p>¹<i>Department of Civil and Environmental Engineering, Politecnico di Milano, Milan, Italy</i></p> <p>²<i>Structural Engineering Department, Zagazig University, Zagazig, Egypt</i></p> <p>³<i>Departament de Matemàtiques, Universitat Politècnica de Catalunya, Barcelona, Spain</i></p>	163
14.00	<p>Multi-hazard Mitigation of Building Structures using New Floor Isolation Techniques</p> <p>Hussam Mahmoud and Akshat Chulahwat</p> <p><i>Civil and Environmental Engineering, Colorado State University, Fort Collins, CO</i></p>	179
14.20	<p>Fuzzy-sliding mode supervisory control of an electric seismic shake table</p> <p>Mehdi Soleymani¹ and Amir Hossein Abolmasoumi²</p> <p>¹<i>Mechanical Engineering Department, Arak University, Arak, 65183-5-5638, Iran</i></p> <p>²<i>Electrical Engineering Department, Arak University, Arak, 65183-5-5638, Iran</i></p>	187
14.40	<p>Performance evaluation of a filter-based pseudo-negative stiffness control for seismically isolated structures</p> <p>Wei Gong, Shishu Xiong</p> <p><i>School of Civil Engineering and Mechanics, Huazhong University of Science and Technology, Wuhan 430074, Hubei, PR China</i></p>	196
15.00	<p>Experimental and numerical assessment of a three storey reinforced concrete building submitted to torsion</p> <p>Pierre-Etienne Charbonnel, Benjamin Richard, Stefano Cherubini</p> <p><i>CEA, Seismic Mechanics Laboratory - TAMARIS experimental facility, 91191 Gif-sur-Yvette Cedex, France</i></p>	188

System ID and nonlinear systems

Location: Lecture Theatre 4, Diamond Building

Session Chair: J. Mottershead

Tuesday 12th July

Time		Paper #
16.00	<p>Unscented Kalman filter for simultaneous identification of structural parameters and unknown excitations of a building structure</p> <p>Hongjun Liu, Qin Huang</p> <p><i>Shenzhen Graduate School, Harbin Institute of Technology, Shenzhen, Guangdong, China</i></p>	107
16.20	<p>Parameter Identification of Hysteresis Using Duffing-Like Model</p> <p>Yuan-Che Chien, Tsu-Yun Cheng, Jia-Ying Tu</p> <p><i>Department of Power Mechanical Engineering National Tsing Hua University Hsinchu City, Taiwan (R.O.C.)</i></p>	166
16.40	<p>Mathematical and numerical evaluation of the damping behaviour for a multi-strand bar</p> <p>Haval Asker, Jem Rongong, Charles Lord</p> <p><i>Dynamics Research Group, University of Sheffield,</i></p>	202
17.00		

Wednesday 13th July

Plenary Talk, Wednesday 13th July, 9.00 – 10.00 Location: Lecture Theatre 3, Diamond Building

Control of human-induced vibrations: an integrated approach to vibration serviceability design

Paul Reynolds

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The civil engineering structures of tomorrow will be lighter and more slender than ever before. This is an inexorable trend resulting from architectural desires and the need for future society to use raw materials in an ever more sustainable way. Unfortunately, history has shown us that light and slender civil engineering structures can be highly susceptible to vibrations caused by human activities. Fixing these problems can prove to be extremely difficult, expensive and disruptive and often involves significant structural modifications.

This talk presents some of the recent advances that have been made in the development of advanced vibration control technologies to reduce the adverse effects of human dynamic loading on structures. These technologies have the capacity not only to fix problems when they occur, but may serve to drive a new generation of high performance, efficient and sustainable civil engineering structures by incorporating vibration control technologies into their fundamental vibration serviceability design.

Active and Semi Active Control		
Location: Lecture Theatre 3, Diamond Building Session Chair: M. Zilletti		
Wednesday 13th July		
Time		Paper #
10.30	<p style="text-align: center;">A Method For Computation Of Realizable Optimal Feedback For Semi-Active Controlled Structures</p> <p style="text-align: center;">I. Halperin¹, G. Agranovich¹ & Y. Ribakov²</p> <p style="text-align: center;">¹<i>Department of Electrical and Electronics Engineering, Faculty of Engineering, Ariel University, Ariel, 40700, Israel,</i></p> <p style="text-align: center;">²<i>Department of Civil Engineering, Faculty of Engineering, Ariel University, Ariel, 40700, Israel</i></p>	118
10.50	<p style="text-align: center;">Active control of a non-smooth nonlinear system using feedback linearisation</p> <p style="text-align: center;">Domenico Lisitano¹, Shakir Jiffri², Elvio Bonisoli¹ and John E Mottershead²</p> <p style="text-align: center;">¹<i>Dipartimento di Produzione, Politecnico di Torino, Corso Duca degli Abruzzi, 24, 10129 Torino, Italy</i></p> <p style="text-align: center;">²<i>Centre for Engineering Dynamics, University of Liverpool, Liverpool L69 3GH, UK</i></p>	148
11.10	<p style="text-align: center;">LQR–UKF Semi–Active Control Of Uncertain Structures</p> <p style="text-align: center;">Dertimanis, V.K.¹, Chatzi, E.N.¹ & Weber, F.²</p> <p style="text-align: center;">¹<i>ETH Zurich, Institute of Structural Engineering, Department Of Civil, Environmental and Geomatic Engineering, 8093 Zurich, Switzerland</i></p> <p style="text-align: center;">²<i>Maurer Switzerland GmbH, 8032 Zurich, Switzerland</i></p>	161
11.30	<p style="text-align: center;">A semi-active rocking system for wind turbines under extreme wind loads</p> <p style="text-align: center;">Nicola Caterino¹, Christos T. Georgakis², Mariacristina Spizzuoco³, Antonio Occhiuzzi¹⁴</p> <p style="text-align: center;">¹<i>Department of Civil Engineering, University of Naples “Parthenope”, Italy</i></p> <p style="text-align: center;">²<i>Department of Civil Engineering, Technical University of Denmark (DTU), Denmark</i></p> <p style="text-align: center;">³<i>Department of Structures for Engineering and Architecture, University of Naples Federico II, Italy</i></p> <p style="text-align: center;">⁴<i>Construction Technologies Institute, Italian National Research Council (CNR), Italy</i></p>	189
11.50		

Special Session: Damping		
Location: Lecture Theatre 3, Diamond Building Session Chair: J. Rongong		
Wednesday 13th July		
Time		Paper #
13.40	<p style="text-align: center;">Electromechanical pendulum for vibration control and energy harvesting</p> <p style="text-align: center;">Michele Zilletti, Stephen J. Elliott, Maryam Ghandchi Tehrani <i>University of Southampton, Institute of Sound and Vibration Research, SO17 1BJ Southampton, UK</i></p>	102
14.00	<p style="text-align: center;">Analysis of multiple-degree-of-freedom systems containing multi-functional friction damper</p> <p style="text-align: center;">Chia-Shang Chang Chien, Wun-Syuan Huang, Yu-Ping Cheng <i>Department of Civil Engineering and Engineering Management ; National Quemoy University; 1 University Road; Jinning; Kinmen 892; Taiwan.</i></p>	116
14.20	<p style="text-align: center;">Experimental Study on the Application of Electro-Adhesive Gel Dampers to Base-Isolated Building Using a Small-Scale Specimen</p> <p style="text-align: center;">Masashi OMURA¹, Masayuki KOHIYAMA¹, Yasuhiro KAKINUMA¹, Hidenobu ANZAI² <i>¹Graduate School of Science and Technology, Keio University ²Fujikura Kasei Co., Ltd.</i></p>	153
14.40	<p style="text-align: center;">Prestressing for local isolation of forced vibrations</p> <p style="text-align: center;">Grzegorz Suwała¹, Lech Knap², Jan Holnicki-Szulc¹ <i>¹Institute of Fundamental Technological Research, IPPT-PAN, Warsaw, PL ² Institute of Vehicles, Faculty of Automotive and Construction Machinery Engineering, WUT, Warsaw, PL</i></p>	154
15.00	<p style="text-align: center;">Damping Of Metallic Wool With Embedded Rigid Body Motion Amplifiers</p> <p style="text-align: center;">Charles E. Lord, Jem A. Rongong, and Ning Tang <i>University of Sheffield, Department of Mechanical Engineering, Sir Frederick Mappin Building, Mappin Street, Sheffield, S1 3JD, United Kingdom</i></p>	198

Inerters		
Location: Lecture Theatre 4, Diamond Building Session Chair: J. Jolnicki-Szulc		
Wednesday 13th July		
Time		Paper #
10.30	<p style="text-align: center;">Investigation Into The Effect Of Device Nonlinearity In Tuned-Inerter-Dampers</p> <p style="text-align: center;">Lazar, IF, Gonzalez-Buelga, A & Neild, SA <i>Department of Mechanical Engineering, University of Bristol, Queen's Building, University Walk, BS8 1TR, Bristol, UK</i></p>	105

10.50	<p>Control of across-wind vortex shedding induced vibrations in tall buildings using the tuned mass-damper-inerter (TMDI)</p> <p>Francesco Petrini¹, Agathoklis Giaralis²</p> <p>¹ <i>Sapienza University of Rome, Rome, ITALY</i></p> <p>² <i>Department of Civil Engineering, City University London, London, UK</i></p>	126
11.10	<p>Passive Vibration Suppression Using Multiple Inerter-Based Devices For A Multi-Storey Building Structure</p> <p>S.Y. Zhang, T.D. Lewis, J.Z. Jiang & S.A. Neild</p> <p><i>Department of Mechanical Engineering, University of Bristol, UK</i></p>	146
11.30	<p>A fluid inerter with variable inertance properties</p> <p>D. Wagg</p> <p><i>Dynamics Research Group, University of Sheffield</i></p>	199
11.50	<p>Resonant Inerter Based Absorbers for a Selected Global Mode</p> <p>Steen Krenk</p> <p><i>Department of Mechanical Engineering, Technical University of Denmark, DK-2800 Lyngby, Denmark</i></p>	194

<p>Interters/Active TMD</p> <p>Location: Lecture Theatre 4, Diamond Building</p> <p>Session Chair: S. Neild</p>		
<p>Wednesday 13th July</p>		
Time		Paper #
13.40	<p>Shaking Table Tests of Cooperative Control between an Active Mass Damper for a Building and Semi-Active Damper for a Base-Isolated Floor Using a Small-Scale Specimen</p> <p>Fumito NAKAMICHI, Masayuki KOHIYAMA</p> <p><i>Graduate School of Science and Technology, Keio University, Yokohama, Japan</i></p>	136
14.00	<p>Robust reliability-based design of seismically excited tuned mass-damper-inerter (TMDI) equipped MDOF structures with uncertain properties</p> <p>Agathoklis Giaralis¹, Alexandros Taflanidis²</p> <p>¹<i>Dept. of Civil Eng., City University London, London, UK</i></p> <p>²<i>Dept. of Civil and Environmental Eng. and Earth Sciences, University of Notre Dame, Notre Dame, IN, USA</i></p>	150
14.20	<p>Performance Assessment Of A Novel Energy Harvesting-Enabled Tuned Mass-Damper-Inerter (EH-TMDI) For White Noise-Excited Structures</p> <p>Salvi, J., Giaralis, A.</p> <p><i>Department of Civil Engineering, City University of London, Northampton Square, London EC1V 0HB, UK</i></p>	151

14.40	<p style="text-align: center;">Investigation of Size Effect on Control Performance of Tuned Liquid Dampers by using Real-Time Hybrid Simulation</p> <p style="text-align: center;">Fei Zhu, Jin-Ting Wang, Feng Jin, Li-Qiao Lu</p> <p style="text-align: center;"><i>State Key Laboratory of Hydrosience and Engineering, Tsinghua University, Beijing 100084,</i></p>	114
15.00		