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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					
	Diamond LT3	**Diamond LT4**	**Diamond LT3**	**Diamond LT4**	**Diamond LT3**	**Diamond LT4**
9.00-10.00	Keynote: M. Todd	N/A	Keynote: A. Preumont	N/A	Keynote: P. Reynolds	N/A
10.00-10.30	Coffee Break - Diamond basement					
10.30-10.50	Control 1 (Chair: F Casciati)	Smart materials (Chair: O Ganilova)	Civil SHM (Chair: J Brownjohn)	Earthquake 2 (Chair: V Gattulli)	Active and semi active control (Chair: M Zilletti)	Inerters (Chair: J Holnicki-Szulc)
10.50-11.10						
11.10-11.30						
11.30-11.50						
11.50-12.10						
12.10-13.40	Lunch Buffet - Diamond basement					
13.40-14.00	Control 2 (Chair: J Rodellar)	Earthquake 1 (Chair: C Lord)	SHM 2 (Chair: N. Dervilis)	Earthquake 3 (Chair: A. Giaralis)	Damping (Chair J. Rongong)	Inerters/Active TMD (Chair: S Neild)
14.00-14.20						
14.20-14.40						
14.40-15.00						
15.00-15.20						
15.20-16.00	Coffee Break - Diamond basement					
16.00-16.20	SHM 1 (Chair: C Sbarrufatti)	Tuned mass dampers (Chair: I Lazar)	Hybrid testing (Chair: O Bursi & N Tondini)	System ID and nonlinear systems (Chair: J Mottershead)	**Diamond tours**	
16.20-16.40						
16.40-17.00						
17.00-17.20					**Conference Close**	
Evening	Drinks reception - Diamond basement		Conference Dinner - Cutlers Hall			

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	**Fault Tolerant Control Design of Floating Offshore Wind Turbines** Rodellar, J., Tutivén, C., Acho, L, Vidal, Y *Universitat Politècnica de Catalunya, Barcelona College of Industrial Engineering, Control Dynamics and Applications Research Group, Comte d'Urgell, 187, Barcelona 08036, Spain*	160
10.50	**Manageable Reactor Pressure Vessel Materials Control Surveillance Programme** Krasikov E. A. *National Research Centre «Kurchatov Institute», 1, Kurchatov sq., 123182 Moscow, Russia*	104
11.10	**MIMO control design including input-output frequency weighting for human-induced vibrations** Xidong Wang*[1], Iván M. Díaz[1], Emiliano Pereira[2] [1]*Universidad Politécnica de Madrid, E.T.S. Ingenieros de Caminos, Canales y Puertos, 28040, Madrid, Spain* [2]*Universidad de Alcalá de Henares, Escuela Politécnica Superior, 28805, Alcalá de Henares (Madrid), Spain*	106
11.30	**Real Time Control of Shake Tables for Nonlinear Hysteretic Systems** Ki P. Ryu, Andrei M. Reinhorn *University at Buffalo, State University of New York, USA*	110
11.50	**Mitigation of the structure response based on inertial shock-absorber** Rami Faraj[1], Jan Holnicki-Szulc[1], Lech Knap[2], Jarosław Seńko[2] [1] *Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland* [2] *Warsaw University of Technology, Faculty of Automotive and Construction Machinery Engineering, Poland*	138

Control 2 Location: Lecture Theatre 3, Diamond Building Session Chair: J. Rodellar		
Monday 11th July		
Time		Paper #
13.40	**Receptance based approach for control of floor vibrations** Donald Steve Nyawako[1], Maryam Ghandchi Tehrani[2], Paul Reynolds[1]	139

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

SHM 1 Location: Lecture Theatre 3, Diamond Building Session Chair: C. Sbarufatti		
Monday 11th July		
Time		Paper #
16.00	**Recent Advances on Pseudodynamic Hybrid Simulation of Masonry Structures** G. Abbiati[1], G. Miraglia[2], B. Stojadinovic[1] [1]*Department of Civil, Environmental and Geomatic Engineering (D-BAUG), IBK, ETH Zurich,*	111

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

Special Session: Smart Materials Location: Lecture Theatre 4, Diamond Building Session Chair: O. Ganilova		
Monday 11th July		
Time		Paper #
10.30	**Vibration Response and Damping Behaviour in Sandwich Composites with Magnetorheological Elastomer Core** Pooja Sharma and Nagendra Gopal, K.V. *Department of Aerospace Engineering, Indian Institute of Technology Madras, Chennai, India*	119
10.50	**Semi-active Vibration Control Using Piezoelectric PZT Composite Films** O. Altay[1], R. Wunderlich[2], S. Klinkel[1] *[1]RWTH Aachen University, Faculty of Civil Engineering* *[2]RWTH Aachen University, Faculty of Electrical Engineering and Information Technology*	124
11.10	**Optimal Tuning Of Shunt Parameters For Lateral Beam Vibration Attenuation With Three Collocated Piezoelectric Stack Transducers** Benedict Götz[1], Oliver Heuss[2], Roland Platz[2] & Tobias Melz[1]	149

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

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

	Toshihide Kashima *Building Research Institute, Japan*	
15.00	**Development of Adaptive Rubber Bearings** C. S. Tsai[1], H. C. Su[2], W. C. Huang[1], T. C. Chiang[3] [1]*Department of Civil Engineering, Feng Chia University, Taichung, Taiwan* [2]*Department of Water Resources Engineering and Conservation, Feng Chia University, Taichung,Taiwan* [3]*Earthquake Proof Systems, Inc., Taichung, Taiwan*	134

Tuned Mass Dampers Location: Lecture Theatre 4, Diamond Building Session Chair: I. Lazar		
Monday 11th July		
Time		Paper #
16.00	**Optimal Design And Practical Implementation Of Eddy-Current Tuned Mass Dampers with Permanent Magnets For Multi-Storey Buildings** Álvaro Magdaleno[1], Emiliano Pereira[2], Javier Castaño[3], Norberto Ibán[3], Iván M. Díaz[4] & Antolín Lorenzana,[1] [1]*ITAP, EII, Universidad de Valladolid, 47011, Valladolid, Spain* [2]*EPS, Universidad de Alcal´a, 28805, Alcal´a de Henares (Madrid), Spain* [3]*Centro Tecnol´ogico CARTIF, 47151, Boecillo (Valladolid), Spain* [4]*ETSICCP, Universidad Polit´ecnica de Madrid, 28040, Madrid, Spain*	174
16.20	**Application and Testing of Hybrid Mass Dampers for Vibration Control of Canton Tower** Ping Tan, Yanhui Liu, Fulin Zhou, Shi Huan *Earthquake Engineering Research & Test Center, Guangzhou University, Guangzhou, 510405, P.R. China*	171
16.40	**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)** Norberto Ibán[1], Javier Castaño[1], Álvaro Magdaleno[2], Mariano Cacho[2], Alberto Fraile[3], Antolín Lorenzana[2] [1]*Fundación CARTIF, Parque Tecnológico de Boecillo, Boecillo (Valladolid), Spain* [2]*ITAP. EII. Universidad de Valladolid, Valladolid, Spain* [3]*UPM, Escuela Técnica Superior de Ingenieros Industriales, Madrid, Spain*	182
17.00	Feasiblity Of Viscous Mass Damper With Bingham Fluid Origined Force Restriction Mechanism For Base-Isolated Structure *Masahiro IKENAGA[1], Kohju IKAGO[2] and Norio INOUE[1]* [1]Dept. of Architecture and Building Science, Graduate School of Eng., Tohoku	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 excitationssources 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. Takoma 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 Millenium 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	**Advanced Methodologies and Techniques for Monuments Preservation: the Trajan Arch in Benevento as a Case of Study** Luigi Petti[1], Fabrizio Barone[2], Angelo Mammone[1], Gerardo Giordano[3], A.Di Buono[1] *[1] University of Salerno, Dept. of Civil Engineering, Via Giovanni Paolo II, 132, I-84084 Fisciano.* *[2] University of Salerno, Dept. of Medicine and Surgery, Via S. Allende, I-84081 Baronissi (SA).* *[3] University of Salerno, Via S. Allende, I-84081 Baronissi (SA).*	125
10.50	**HIL model and cable stayed footbridge monitoring/control** Fabio Casciati[1], Sara Casciati[2], Lucia Faravelli[1] *[1] DICAR / University of Pavia/ via Ferrata 3, 27100 Pavia, Italy* *[2] DICAR/University of Catania/ piazza Federico di Svevia, 96100 Pavia, Italy*	140
11.10	**Improving Emergency Response Using Wearable Wireless Sensor Networks and Structural Health Monitoring Systems** Sheikhi, E.[1], Cimellaro, G.P.[2] & Mahin, S.[3] *[1]Department of Control and Computer Engineering (DAUIN), Politecnico di Torino, Italy* *[2]Department of Structural, Building and Geotechnical Eng. (DISEG), Politecnico di Torino, Italy* *[3]Department of Civil and Environmental Engineering, University of California Berkeley, USA*	158
11.30	**A new approach to identification of cracks in beams and experimental verification** Chuanchuan Hou, Yong Lu *Instutute for Infrastructure and Environment, School of Engineering, the University of Edinburgh, Edinburgh EH9 3JL, UK*	168
11.50	**Viability of optical tracking systems for monitoring deformations of a long span bridge** James Brownjohn[1], David Hester[2], Yan Xu[1] Bassitt J[1], Koo K-Y[1] *[1] University of Exeter* *[2]Queen's University Belfast*	172

SHM 2 Location: Lecture Theatre 3, Diamond Building Session Chair: N. Dervilis		
Tuesday 12th July		
Time		Paper #
13.40	**Sensor Selection Based On Principal Component Analysis For Fault Detection In Wind Turbines** Pozo, F. & Vidal, Y *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*	175
14.00	**Quantification Of Uncertainty For Experimentally Obtained Modal Parameters In The Creation Of A Robust Damage Model** Gardner, P, Barthorpe, R & Lord, C *Dynamics Research Group, Department of Mechanical Engineering, University of Sheffield, Mappin Street, Sheffield, UK, S1 3JD*	191
14.20	**Design criteria for structural monitoring system: a preliminary** approach V. Gattulli[1], F. Potenza[1], F.J. Baeza[2] *[1]Dep. of Civil, Architectural and Environmental Engineering, University of L'Aquila, Italy* *[2]Dep. of Civil Engineering, University of Alicante, Spain*	197
14.40	**Tool wear state clustering in milling based on recorded acoustic emission** N. Ray[1], E.J. Cross[1], K. Worden[1], S. Turner[2] and J.P. Villain-Chastre[3] *[1] Dynamics Research Group, Department of Mechanical Engineering, University of Sheffield, Mappin Street, Sheffield, UK, S1 3JD* *[2] AMRC, University of Sheffield* *[3] Messier-Bugatti-Dowty*	201
15.00	**Features of Nonlinear Vibration-Based Structural Health Monitoring** Mohamed S. Eid[1], Ayman H. H. Khalil[2] *[1] STRUCTURE International Consultancy Centre, Abu Dhabi, United Arab Emirates* *[2] Structural Engineering Department, Faculty of Engineering, Ain Shams University, Cairo, Egypt*	193

Special Session: Hybrid Testing Location: Lecture Theatre 3, Diamond Building Session Chair: O Bursi & N Tondini		
Tuesday 12th July		
Time		Paper #
16.00	**Hybrid simulation applied to fire testing: a newly conceived partitioned static solver** Nicola Tondini[1], Giuseppe Abbiati[2], Luca Possidente[1] and Bozidar Stojadinovic[2] *[1]Department of Civil, Environmental and Mechanical Engineering, University of Trento, Via Mesiano, 38123, Trento, Italy* *[2]Department of Civil, Environmental and Geomatic Engineering (D-BAUG), IBK, ETH Zurich, WolfgangPauli-Strasse 27, Switzerland*	121
16.20	**A comparison of online and offline experimental substructuring methods for the simulation of complex linear dynamic systems.** Oreste S. Bursi[1], Vincenzo La Salandra[1], Giuseppe Abbiati[2], Luca Caracoglia[3] *[1]Department of Civil, Environmental and Mechanical Engineering, University of Trento, Trento, Italy.* *[2]Department of Civil, Environmental and Geomatic Engineering (D-BAUG), IBK, ETH Zurich, Switzerland.* *[3]Department of Civil and Environmental Engineering, Northeastern University, Boston, Massachusetts, 02115 USA.*	122
16.40	**A Novel Methodology for Hybrid Fire Testing** Ana Sauca[1], Thomas Gernay[1], Fabienne Robert[2], Nicola Tondini[3], Jean-Marc Franssen[1] *[1]University of Liege, Department ArGEnCo, Liege, Belgium* *[2]CERIB, Fire Testing Center, Epernon, France* *[3]University of Trento, Department of Civil, Environmental and Mechanical Engineering, Italy*	132
17.00	**A Pseudodynamic Testing Algorithm for Obtaining Seismic Responses of Structures** Shuenn-Yih Chang[1], Chiu-Li Huang[2] *[1]National Taipei University of Technology* *[2]Fu Jen Catholic University*	135

Earthquake 2 Location: Lecture Theatre 4, Diamond Building Session Chair: V. Gattulli		
Tuesday 12th July		
Time		Paper #
10.30	**Networked Overlapping Control For Building Benchmark** Bakule, L., Papík, M. & Rehák, B. *Institute of Information Theory and Automation, Czech Academy of Sciences, 182 08 Prague, Czech Republic*	142
10.50	**Seismic test of building floor isolation using polynomial friction pendulum isolators** Lyan-Ywan Lu[1], Liang-Wei Wang[1], Chun-Chung Tsai[2] *[1] Department of Civil Engineering, National Cheng Kung University, 1 University Road, Tainan 701, Taiwan* *[2] National Kaohsiung First University of Science and Technology, Kaohsiung, Taiwan*	143
11.10	**Modelling the Response of Isolation Rubber Bearings with Variable Axial Loading** M. Domaneschi[1], L. Martinelli[1], C. Cattivelli[2] *[1]Department of Civil and Environmental Engineering, Politecnico di Milano, Milan, Italy* *[2] Politecnico di Milano*	147
11.30	**Experimental Study Of The Effectiveness Of Semi-Actively Implemented Power-Law Damping On Suppressing The Seismic Response Of A Base-Isolated Building** Maki DAN[1],Masashi OMURA[1],Fumito NAKAMICHI[1],Masayuki KOHIYAMA[1],& Zi-Qiang LANG[2] *[1]Graduate School of Science and Technology, Keio University, Hiyoshi 3-14-1, Kohoku-ku, Yohokohama-shi, Kanagawa, Japan* *[2]Department of Automatic Control and Systems Engineering, The University of Sheffield, Mappin Street, Sheffield, United Kingdom*	155
11.50	**Application of Crescent-Shaped Brace passive resisting system in multi-storey frame structures** *Omar Kammouh[1], Stefano Silvestri[2], Michele Palermo[2], Gian Paolo Cimellaro[1],* *[1]Politecnico di Torino* *[2]University of Bologna*	157

Earthquake 3 Location: Lecture Theatre 4, Diamond Building Session Chair: A. Giaralis		
Tuesday 12th July		
Time		Paper #
13.40	**Modelling the Axial Response of the Roll-N-Cage Device for Seismic Isolation** M. Colombo[1], M. Domaneschi[1], M. Ismail[2], L. Martinelli[1], J. Rodellar[3] *[1]Department of Civil and Environmental Engineering, Politecnico di Milano, Milan, Italy* *[2]Structural Engineering Department, Zagazig University, Zagazig, Egypt* *[3]Departament de Matemàtiques, Universitat Politècnica de Catalunya, Barcelona, Spain*	163
14.00	**Multi-hazard Mitigation of Building Structures using New Floor Isolation Techniques** Hussam Mahmoud and Akshat Chulahwat *Civil and Environmental Engineering, Colorado State University, Fort Collins, CO*	179
14.20	**Fuzzy-sliding mode supervisory control of an electric seismic shake table** Mehdi Soleymani[1] and Amir Hossein Abolmasoumi[2] *[1]Mechanical Engineering Department, Arak University, Arak, 65183-5-5638, Iran* *[2]Electrical Engineering Department, Arak University, Arak, 65183-5-5638, Iran*	187
14.40	**Performance evaluation of a filter-based pseudo-negative stiffness control for seismically isolated structures** Wei Gong, Shishu Xiong *School of Civil Engineering and Mechanics, Huazhong University of Science and Technology, Wuhan 430074, Hubei, PR China*	196
15.00	**Experimental and numerical assessment of a three storey reinforced concrete building submitted to torsion** Pierre-Etienne Charbonnel, Benjamin Richard, Stefano Cherubini *CEA, Seismic Mechanics Laboratory - TAMARIS experimental facility, 91191 Gif-sur-Yvette Cedex, France*	188

System ID and nonlinear systems Location: Lecture Theatre 4, Diamond Building Session Chair: J. Mottershead		
Tuesday 12th July		
Time		Paper #
16.00	**Unscented Kalman filter for simultaneous identification of structural parameters and unknown excitations of a building structure** Hongjun Liu, Qin Huang *Shenzhen Graduate School, Harbin Institute of Technology, Shenzhen, Guangdong, China*	107
16.20	**Parameter Identification of Hysteresis Using Duffing-Like Model** Yuan-Che Chien, Tsu-Yun Cheng, Jia-Ying Tu *Department of Power Mechanical Engineering National Tsing Hua University Hsinchu City, Taiwan (R.O.C.)*	166
16.40	**Mathematical and numerical evaluation of the damping behaviour for a multi-strand bar** Haval Asker, Jem Rongong, Charles Lord *Dynamics Research Group, University of Sheffield,*	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

Professor of Structural Dynamics and Control
University of Exeter

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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	**A Method For Computation Of Realizable Optimal Feedback For Semi-Active Controlled Structures** I. Halperin[1], G. Agranovich[1] & Y. Ribakov[2] *[1]Department of Electrical and Electronics Engineering, Faculty of Engineering, Ariel University, Ariel, 40700, Israel,* *[2]Department of Civil Engineering, Faculty of Engineering, Ariel University, Ariel, 40700, Israel*	118
10.50	**Active control of a non-smooth nonlinear system using feedback linearisation** Domenico Lisitano[1], Shakir Jiffri[2], Elvio Bonisoli[1] and John E Mottershead[2] *[1]Dipartimento di Produzione, Politecnico di Torino, Corso Duca degli Abruzzi, 24, 10129 Torino, Italy* *[2]Centre for Engineering Dynamics, University of Liverpool, Liverpool L69 3GH, UK*	148
11.10	**LQR–UKF Semi–Active Control Of Uncertain Structures** Dertimanis, V.K.[1], Chatzi, E.N.[1] & Weber, F.[2] *[1]ETH Zurich, Institute of Structural Engineering, Department Of Civil, Environmental and Geomatic Engineering, 8093 Zurich, Switzerland* *[2]Maurer Switzerland GmbH, 8032 Zurich, Switzerland*	161
11.30	**A semi-active rocking system for wind turbines under extreme wind loads** Nicola Caterino[1], Christos T. Georgakis[2], Mariacristina Spizzuoco[3], Antonio Occhiuzzi1[4] *[1] Department of Civil Engineering, University of Naples "Parthenope", Italy* *[2] Department of Civil Engineering, Technical University of Denmark (DTU), Denmark* *[3] Department of Structures for Engineering and Architecture, University of Naples Federico II, Italy* *[4] Construction Technologies Institute, Italian National Research Council (CNR), Italy*	189
11.50		

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

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10.30	**Investigation Into The Effect Of Device Nonlinearity In Tuned-Inerter-Dampers** Lazar, IF, Gonzalez-Buelga, A & Neild, SA *Department of Mechanical Engineering, University of Bristol, Queen's Building, University Walk, BS8 1TR, Bristol, UK*	105

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

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13.40	**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** Fumito NAKAMICHI, Masayuki KOHIYAMA *Graduate School of Science and Technology, Keio University, Yokohama, Japan*	136
14.00	**Robust reliability-based design of seismically excited tuned mass-damper-inerter (TMDI) equipped MDOF structures with uncertain properties** Agathoklis Giaralis[1], Alexandros Taflanidis[2] *[1]Dept. of Civil Eng., City University London, London, UK* *[2]Dept. of Civil and Environmental Eng. and Earth Sciences, University of Notre Dame, Notre Dame, IN,USA*	150
14.20	**Performance Assessment Of A Novel Energy Harvesting-Enabled Tuned Mass-Damper-Inerter (EH-TMDI) For White Noise-Excited Structures** Salvi, J., Giaralis, A. *Department of Civil Engineering, City University of London, Northampton Square, London EC1V 0HB, UK*	151

14.40	**Investigation of Size Effect on Control Performance of Tuned Liquid Dampers by using Real-Time Hybrid Simulation** Fei Zhu, Jin-Ting Wang, Feng Jin, Li-Qiao Lu *State Key Laboratory of Hydroscience and Engineering, Tsinghua University, Beijing 100084,*	114
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