Joint Conference

6th International Conference on Advances in Experimental Structural Engineering (6AESE)

and

11th International Workshop on Advanced Smart Materials and Smart Structures Technology (11ANCRiSST)

University of Illinois at Urbana-Champaign
August 1-2, 2015

Final Program
Illini Union – Second Level North

Illini Union – Third Level North
SCHEDULE AT A GLANCE

SATURDAY, AUGUST 1, 2015

08:00 - 08:45    Registration – Illini Union Lobby
08:45 - 09:15    Opening Ceremony – Illini Union Room A
09:15 - 10:00    Plenary Lecture 1 – Illini Union Room A
10:00 - 10:30    Break w/ coffee and snacks
10:30 - 11:15    Plenary Lecture 2 – Illini Union Room A
11:15 - 12:00    Plenary Lecture 3 – Illini Union Room A
12:00 - 13:30    Seated Lunch / Luncheon Speaker – Illini Union Room 314A, 314B & 104
13:30 - 14:00    Break / Walk to Newmark
14:00 - 15:40    Parallel Session 1 – Newmark Civil Engineering Laboratory
15:40 - 16:10    Break w/ coffee and snacks – Newmark Lab Crane Bay
16:10 - 17:50    Parallel Session 2 – Newmark Civil Engineering Laboratory
18:30 - 21:00    Welcome Reception – Newmark Lab Crane Bay

SUNDAY, AUGUST 2, 2015

08:30 - 10:10    Parallel Session 3 – Newmark Civil Engineering Laboratory
10:10 - 10:40    Break w/ coffee and snacks – Newmark Lab Crane Bay
10:40 - 12:20    Parallel Session 4 – Newmark Civil Engineering Laboratory
12:20 - 13:30    Standing Lunch Buffet – Newmark Lab Crane Bay
13:30 - 15:10    Parallel Session 5 – Newmark Civil Engineering Laboratory
15:10 - 15:45    Walk to Illini Union / Coffee Break – Illini Union Room A
15:45 - 16:30    Plenary Lecture 4 – Illini Union Room A
16:30 - 17:15    Plenary Lecture 5 – Illini Union Room A
17:15 - 18:00    Plenary Lecture 6 – Illini Union Room A
18:30 - 20:00    Closing Banquet – Illini Union Ballroom
Dear Conference Delegates:

Welcome to the University of Illinois! We are very pleased that you are joining us here in Urbana-Champaign for this exciting event - the first joint convocation of the International Conference on Advances in Experimental Structural Engineering (AESE) and the International Workshop on Advanced Smart Materials and Smart Structures Technology (ANCRiSST). These gatherings have rich histories of international participation and collaboration, so we are excited to foster even broader professional and personal interaction as we bring AESE and ANCRiSST together.

By the force of your participation, we have an excellent program with a wide range of structural engineering topics covering materials, design, experimentation, simulation, sensing and health monitoring. The conference includes over 250 technical presentations with almost 240 delegates representing 8 countries. We are anticipating a vibrant two days of interaction as we hear about cutting-edge research, catch up with old friends and make new connections. We trust that you will enjoy your time here on the U of I campus and in Urbana-Champaign!

Best regards,

Billie F. Spencer, Jr.
Larry A. Fahnestock
CONFERENCE LOGISTICS

Registration. All on-site registrations will take place in the lobby of the Illini Union. Also, a Welcome Package will be given to all Registered Delegates.

Conference Venue. The plenary sessions will be held at the Illini Union, located at 1401 West Green Street in Urbana, Illinois, on the campus of the University of Illinois at Urbana-Champaign. Meanwhile, all parallel sessions will be held at the Newmark Civil Engineering Laboratory (NCEL) in the M.T. Geoffrey Yeh Student Center within the Civil and Environmental Engineering Department at the University of Illinois at Urbana-Champaign. The Newmark Civil Engineering Lab is located at 205 North Matthews Avenue, on the north edge of campus.

Lunch. On Saturday, the Luncheon will be served in Rooms 314A, 314B and 104 of the Illini Union. Meanwhile, the theme for Sunday’s standing lunch will be “The Best Texas BBQ in Illinois”, and it will be served in the Crane Bay of the Newmark Structural Engineering Building.

Breaks. Coffee breaks in Illini Union will be served in Illini Union Room A. Meanwhile, the coffee breaks in Newmark Building will be served in the Crane Bay of the Newmark Structural Engineering Laboratory.

Internet Access. Complimentary wifi accounts have been secured. Please see your temporary, personal log in information provided with your name badge and welcome package.

Emergencies. To report any police, fire or medical emergency, call 911. In the event of a fire, please pull the manual fire alarm BEFORE calling 911. Evacuate the building immediately. Campus emergencies may be reported to Campus Police by activating any (Blue Light) phone located throughout campus. In case of severe weather, if you are outside, proceed to the nearest protective building.

SOCIAL EVENTS

Saturday, August 1 – Welcome Reception
18:30 – 21:00
Newmark Civil Engineering Building, Crane Bay

Sunday, August 2 – Closing Banquet
18:30 – 20:00
Illini Union Ballroom
Abstract
Academic institutions are the primary engine of intellectual advancement and economic development. Engaged in education, research and service to the technical community and civil society, universities have pressing financial needs, and are therefore also engaged in fund-raising and fiscal optimization. The business models of academe are not just exceptionally complex but also poorly understood and documented. On the other hand, industrial organizations while being in a much more competitive life-or-death ecosystem, have a clear business model that defines inputs and outputs. The literature has an abundance, even an over-supply, of business models, while the same is not true for academic institutions. We will discuss the question of whether excellence in learning, discovery and engagement can be achieved in the absence of robust business practices and strong academic leadership. We will also talk about the future of engineering education, research and service, and the requirements that success imposes on the business functions of academic institutions, as well as the features of institutions that are likely to thrive in the modern world.

Biographical Sketch
Fellow of the British Royal Academy of Engineering, Dr. Amr Elnashai is the Dean of Engineering at the Pennsylvania State University, and the Harold and Inge Marcus Chair of Engineering. He was previously head of the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign, USA and the Bill and Elaine Hall endowed professor in the same department. He was Director of the NSF multi-institution interdisciplinary Mid-America Earthquake Center (2004-2009). He was also Director of the NSF Network for Earthquake Engineering Simulations (NEES) Laboratory at Illinois (2002-2009). Amr obtained his Bachelor of Science degree from Cairo University, followed by M.Sc. and Ph.D. degrees from Imperial College, University of London. Before joining the University of Illinois in June 2001, Amr was Professor of Earthquake Engineering and Head of Division at Imperial College (1985-2001). He is founder, copyright holder and co-editor of the Journal of Earthquake Engineering and editorial board member of several other journals, a member of the drafting panel of the European design codes, past chair of the UK earthquake engineering association, UK delegate to and past senior Vice-President of the European Association of Earthquake Engineering and a member of the Council of the UK Institution of Structural Engineers. He is the winner of the Imperial College Unwin Prize for the best PhD thesis in Civil and Mechanical Engineering (1984), the Oscar Faber Medal for best paper in the Institution of Structural Engineering, and two best paper medals from the International Association of Tall Buildings, Los Angeles. Elnashai's technical interests are multi-resolution distributed analytical simulations, network analysis, large-scale hybrid testing and field investigations of the response of complex networks and structures to earthquakes. He has produced more than 250 research publications, comprising over 140 refereed journal papers and many conference papers.
Geometry and the Design of Structures
William F. Baker, Skidmore, Owings & Merrill LLP (SOM)
Sunday, August 2, 2015
19:15 – 20:00
Illini Union Ballroom

Abstract
Geometry is central to the intersection of structure and architecture. The proportion, shape and configuration of a structural system are critical to its function, effectiveness and efficiency. In many cases, the structure and architecture are inseparable; it is impossible to describe one without also describing the other. The lecture will discuss the importance of the geometry of structure and architecture. The presentation will present classical and emerging techniques for structural form creation that may lead to new architectural opportunities that are both efficient and inspiring.

Biographical Sketch
William F. Baker is a Structural Engineering Partner for Skidmore, Owings & Merrill, LLP, where he strives to extend the profession of structural engineering through design, research, teaching, and professional activities. A particular focus of Baker’s work is the design and engineering of supertall towers. He led the development of the “buttressed core” structural system for the Burj Khalifa, the world’s tallest manmade structure. In addition to his work on supertall buildings, his expertise also extends to long-span roof structures, such as the Korean Air Lines Operations Hangar and the Virginia Beach Convention Center, as well as noteworthy structures such as Broadgate Exchange House and the GM Renaissance Center-North Lobby. Baker has also collaborated with numerous artists, including Jamie Carpenter (Raspberry Island-Schubert Club Band Shell), Iñigo Manglano-Ovalle (Gravity is a Force to be Reckoned With), James Turrell (Roden Crater), and Jaume Plensa (World Voices). In addition to many other honors, Baker was elected to the Royal Academy of Engineering in 2014.
New Engineering Insights Gained using New Generation of Sensor Systems
Kenichi Soga, University of Cambridge
Saturday, August 1, 2015
09:15 – 10:00
Illini Union Room A

Abstract
In recent years, research and technology development on sensor and communications have been undergoing a revolution. In particular, we are starting to see certain innovative sensing techniques such as computer vision, fibre optic sensing, miniature sensors (Micro-electro-mechanical systems (MEMS)) and wireless sensor network introduced in engineering practice for condition assessment and monitoring of structures, and in some cases replacing the existing methods. Using such innovations, there are great opportunities for civil engineers to advance our understanding of the performance of structures. Active monitoring will provide engineering intelligence when the actual behaviour of the structure is compared to the design prediction. Several case studies in London will be presented in the talk to demonstrate that we can be more proactive than we used to be in closing the gap between theory and application by using recent advances in field instrumentation and monitoring systems.

Biographical Sketch
Kenichi Soga is Professor of Civil Engineering and the Head of the Geotechnical Group at the University of Cambridge. He is Fellow of the Royal Academy of Engineering as well as Fellow of the Institution of Civil Engineers. He obtained his BEng and MEng from Kyoto University in Japan and PhD from the University of California at Berkeley in 1994. His current research activities are innovative monitoring and long-term performance of geoinfrastructure, energy geomechanics, and modeling of geotechnical construction processes. He has published more than 250 journal and conference papers and is co-author of "Fundamentals of Soil Behavior, 3rd edition" with Professor James K Mitchell. He is recipient of many awards including George Stephenson Medal (2006) and Telford Gold Medal (2010) from the Institution of Civil Engineers and Walter L. Huber Civil Engineering Research Prize (2007) from the American Society of Civil Engineers.
KEYNOTE LECTURE

Site Measurements and Analysis of Three Real Tall Buildings Tested in Laboratory before Construction
Xilin Lu, Tongji University
Saturday, August 1, 2015
10:30 – 11:15
Illini Union Room A

Abstract
In this work, three real tall buildings were instrumented and studied. Model tests of the three buildings were all implemented on shaking table in laboratory before construction. A recently developed fast Bayesian FFT method is utilized to perform analysis. In addition to the most probable values, the associated posterior uncertainty is also obtained, providing an estimation tool to assess the accuracy of the identified modal parameters.

This study shows again that the vibration test and modal identification could provide the dynamic property of a building in a reliable manner. The comparison between the results of field and shaking table tests could assist to verify the design and accuracy of the shaking table model, which provides a reference for the reliability of the estimation of seismic performance taking use of the same model and shaking table tests. Challenges do exist simultaneously, for instance, the prediction of damping ratios using the shaking table model. It is still a difficulty to find the relationship of damping ratio between the real structure and the one tested in the shaking table test, however, the comparison results are helpful to improve the future design and testing of shaking table model.

Biographical Sketch
Professor Xilin LU, received his Ph. D. in December 1984, and now works at State Key Laboratory of Disaster Reduction in Civil Engineering, Tongji University. He currently has the following academic and professional positions: Chief Editor of “The structural Design of Tall and Special Buildings”; Vice President of Earthquake Resistance and Disaster Reduction Committee, China Architectural Society; Editorial Board Members: Journal of “Soil Dynamics and Earthquake Engineering”, Journal of “Smart Materials and Systems”, Journal of “Earthquake Engineering”; Editorial Board Member, Journal of Asia architecture and Building Engineering; Member and fellow, International Association for Bridge and Structural Engineering. His research interests are Structural Engineering and Earthquake Engineering.
KEYNOTE LECTURE

Computer Vision for Engineering Applications
Shirley Dyke, Purdue University
Saturday, August 1, 2015
11:15 – 12:00
Illini Union Room A

Abstract
Recent advances in computer vision are enabling autonomous evaluation of civil engineering structures. Low-cost, high performance cameras, used in conjunction with aerial or embedded sensing platforms, are breaking down the spatial and temporal challenges previously associated with visual sensing. Well-established computer vision algorithms provide efficient and rapid analysis of the visual data collected. However, beyond simply processing these images, aiming to replicate the actions and abilities of human vision is needed to inform decision-making. Computer vision techniques, such as image processing, object detection, or multi-view geometry, are increasingly being implemented for a broad range of engineering applications. This talk will discuss the novel use of computer vision methods to address two promising needs in civil engineering. High-level image processing and analysis, when integrated with prior knowledge of general damage features, provides reliable capabilities supporting visual inspection. Next, repurposing of object detection techniques that originate from computer vision methods is also shown to effectively address vehicle classification.

Biographical Sketch
Shirley J. Dyke is a professor of mechanical engineering and a professor of civil engineering at Purdue University. She received her B.S. in Aeronautical and Astronautical Engineering from the University of Illinois, Champaign-Urbana and her Ph.D. degree in Civil Engineering from the University of Notre Dame in 1996. Dr. Dyke was awarded the Presidential Early Career Award for Scientists and Engineers, the Short-term Invitation Fellowship from the Japan Society for the Promotion of Science, the International Association on Structural Safety and Reliability Junior Research Award and the ANCRiSST Young Investigator Award. She was the Edward C. Dicke Professor of Engineering at Washington University in St. Louis until 2009. Dr. Dyke’s research efforts have addressed a variety of issues related to the development and implementation of “smart” structures, including innovative control technologies, structural health monitoring and real-time hybrid simulation methods. Dr. Dyke also directs the Intelligent Infrastructure Systems Lab at Purdue's Bowen Lab and is currently a co-leader for Information Technology for the NSF-funded Network for Earthquake Engineering Simulation (NEES).
Seismic Behavior of Composite Beams under Damper and Frame Forces of Shifted Phases: Findings from Full-Scale Tests of Buildings and Subassemblies
Kazuhiko Kasai, Tokyo Institute of Technology
Sunday, August 2, 2015
15:45 – 16:30
Illini Union Room A

Abstract
Supplemental-damping technology is suitable for a steel frame because of ease for connecting dampers and relatively low frame stiffness requiring drift control. During an earthquake, the members surrounding the damper are subjected to combined bending moment and axial force produced cyclically by the actions of the damper and frame, respectively. Damper force and damper deformation have shifted phase, and the latter is in-phase with the frame story drift, which makes phase difference between the moment and axial force.

These as well as slab and beam composite actions, and stress concentrations at the gusset plate for connecting damper make beam behavior complex, and they are discussed by analyzing data from the two experimental projects; shake-table tests of a full-scale 5-story building, and cyclic tests of the beam-column-gusset plate subassemblies. The cyclic test employs a newly developed loading method alternating displacement control for story drift, and force control for damper force whose target value is calculated step-by-step by a hybrid scheme using the numerical model of the damper.

When analyzing the data, two contributions having phases of story drift and damper force, respectively, are extracted from each of the forces shared by the steel beam, concrete slab, gusset plate, and their corresponding strains. The results as well as implication to analysis/design of the members and connections in the damper bay are discussed.

Biographical Sketch
Prof. Kazuhiko Kasai received Ph.D. degree from University of California, Berkeley in 1985. He was a faculty member at Illinois Institute of Technology and later at Lehigh University in US, and became a professor in 1997 at Tokyo Institute of Technology. He has been chairing various committees on response control and steel structures in Japan. Prof. Kasai was the Japan-side leader of the NEES and E-Defense US-Japan steel building research projects, including full-scale experiments mentioned above. He was also the Japan-side leader of the China-Japan joint research on seismic evaluation and mitigation for super-tall buildings, sponsored by the National Natural Science Foundation of China and Japan Science and Technology Agency.
KEYNOTE LECTURE

Hybrid Structural Health Monitoring Techniques for Prestressed Structure
Jeong-Tae Kim, Pukyong National University
Sunday, August 2, 2015
16:30 – 17:15
Illini Union Room A

Abstract
A variety of prestressed structures have been widely constructed around the world. They include, but not limited to, concrete girders, cable-stayed bridges, nuclear containments, and subsea “Archimedes” tunnels. Applying prestress force gives many benefits: the strength of the structure could be increased and the structural weight would be reduced, at the same time. So structures can be bigger, larger and even slimmer. Relying on the prestressing technique, however, is followed by severe risks since the prestress-loss may induce the significant reduction of load carrying capacity and even global structural failure.

Concerned with the above-mentioned issues, a hybrid structural health monitoring (H-SHM) methodology of prestressed structures via smart sensor techniques has been studied by the research team at Pukyong National University, Busan, Korea. The first part of the presentation presents the methodology development of H-SHM via smart sensors. The second part of the presentation introduces a field application of the H-SHM techniques and wireless sensor network to a cable-stayed bridge. The performance of the sensor nodes has been evaluated in lieu of wireless communication, solar-power supply and modal parameter extraction. For long-term monitoring, the effects of ambient and loading histories including temperature variation, wind and typhoon on the bridge’s characteristics have been experimentally investigated.

Biographical Sketch
Dr. Jeong-Tae Kim received his Ph.D. in Civil (Structural) Engineering from Texas A&M University in 1993. He has worked on the faculty at Pukyong National University for 21 years, where he currently serves the Head in Department of Ocean Engineering. He has led BK21Plus Program “human resource for eco-friendly multi-functional coastal-harbor structural system”, granted by Korean Government for the last 10 years. He has served as editors, chairs, board members for several journals and conferences. He currently serves as an editor-in-chief of Structural Monitoring and Maintenance, an international journal, Techno-Press. Dr. Jeong-Tae Kim’s research has been primarily in the area of damage detection and system identification theories, structural health monitoring techniques, smart sensors and wireless networks, and application of SHM techniques to civil infrastructures. Dr. Kim authored or edited three books, published over 300 papers including 70 SCI-indexed journal papers and 150 international conference papers. He also registered two patents on electromechanical impedance-based SHM techniques. Dr. Kim has been awarded as Premier Professor of the Year 2008-2013 from Pukyong National University.
Recent Advances in Hybrid Simulation
Stephen A. Mahin, University of California, Berkeley
Sunday, August 2, 2015
17:15 – 18:00
Illini Union Room A

Abstract
Hybrid simulation has been used for a variety of important applications to improve understanding of the inelastic dynamic behavior of structures and structural components too large, strong, or dangerous to test by conventional means. This presentation discusses several recent research projects that have taken promising theoretical concepts and implemented them in large-scale test facilities. These implementations include specialized applications of hybrid substructure testing, and deployment of hybrid or “smart” earthquake simulator platforms. To enable these tests, high performance parallel computational resources are used to compute the response of the analytical portions of the hybrid model, as well as to carry out the hybrid analysis and control the overall simulation. All of the components of the simulation process were integrated using OpenFresco.

Biographical Sketch
Stephen Mahin has sought through the integration of computational, experimental and theoretical studies to improve earthquake safety and resilience of the built environment. He has helped formulate and lead a number of notable national and international cooperative research efforts, including the SAC Steel Program, various NSF cooperative programs between the US and Japan, and the Pacific Earthquake Engineering Research Center. He holds the Byron and Elvira Nishkian Endowed Chair of Structural Engineering at the University of California, Berkeley.
# PARALLEL SESSIONS
## SATURDAY, AUGUST 1, 2015

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<td>16:10 - 17:50</td>
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## PARALLEL SESSION 1 – SATURDAY, AUGUST 1

### MS30: Innovations in Structural Health Monitoring Algorithms

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<td>Co-Chairs: Hongki Jo &amp; Songye Zhu</td>
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<td>278. Hilbert Transform and its Applications in System Identification</td>
<td>Genda Chen*</td>
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<td>14:00 – 15:00</td>
<td>173. Reference-free Deflection Measurement of General-shape Bridges using Data Fusion</td>
<td>Soojin Cho*, Chung-Bang Yun, Sung-Han Sim</td>
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<td>15:00 – 15:20</td>
<td>266. Adaptive-scale Damage Detection of Plate Structures using Wavelet FEM</td>
<td>Wen-Yu He, Songye Zhu*</td>
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<td>15:20 – 15:40</td>
<td>270. Structural Stiffness Identification Based on Incomplete Modal Data with Uncertainties</td>
<td>Wenai Shen*, Ying Lei, Hongping Zhu, Zhouquan Feng</td>
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### RS73: Structural Health Monitoring

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<td>1311 Newmark</td>
<td>Co-Chairs: Shinae Jang &amp; Yukio Tamura</td>
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<td>14:00 – 15:00</td>
<td>191. A Curvature Based Approach in Dynamic Monitoring using Long-gage Fiber Optic Sensors</td>
<td>Kaitlyn Kliewer*, Branko Glisic</td>
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<td>14:00 – 15:20</td>
<td>192. Data-Driven Structural Damage Diagnosis</td>
<td>S. Golnaz Shahidi*, Shamim N. Pakzad</td>
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<td>15:00 – 15:20</td>
<td>194. Unmanned Aerial Vehicle (UAV)-powered Concrete Crack Detection Based on Digital Image Processing</td>
<td>Hyunjun Kim*, Sung-Han Sim, Soojin Cho</td>
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110. Experimental Tests of Reinforced Concrete Frame Subassemblies with Buckling Restrained Braces in Double-K Configuration
Zhe Qu*, Jinzhen Xie, Tao Wang
14:00 – 14:20

114. Experimental Study on Damage Behavior of Steel Plate-Reinforced Concrete Tubes
Huanjun Jiang*, Bin Wang, Xilin Lu
14:20 – 14:40

115. Design Method for Shaking Table Test on Isolated Structures using Friction Pendulum Bearings
Chengcheng Hu, Ying Zhou*, Peng Chen, Wensheng Lu, Xilin Lu
14:40 – 15:00

117. Experimental Research on Seismic Behavior of Composite Concrete and Double Steel Plates Shear Wall with Binding Bars
Chunlan Cheng*, Deyuan Zhou
15:00 – 15:20

150. Shake Table Tests of Reinforced Concrete Bridge Columns under Long Duration Ground Motions
Mohammed Saeed Mohammed*, David H. Sanders, Ian Buckle
15:20 – 15:40

111. Optimal Design of Visco-Elastic Devices Coupling Two Simple Oscillators under Seismic Excitation
Vincenzo Gattulli*, Francesco Potenza
14:00 – 14:20

116. Study on Energy Dissipation of Viscous Dampers Considering Soil-Structure Dynamic Interaction
Peizhen Li*, Jinping Yang, Xilin Lu
14:20 – 14:40

123. Shaking Table Test of the Controllable Rocking Reinforced Concrete Frames
Liang Lu*, Jianwen Luo, Xilin Lu
14:40 – 15:00
125. The Study of Sliding Displacement Spectrum on Sliding Base Isolation Structure
Xiong Zhong-Ming, Chen Xuan*, Yu Zi-Liang
15:00 – 15:20

185. Numerical Study on the Benefits of Base Isolation for Blast Loading
Ruiyang Zhang, Brian Phillips*
15:20 – 15:40

RS40: Novel Testing, Measuring, and Monitoring Techniques in Structural Experiments
PS1 Saturday, August 1, 14:00 – 15:40

119. New Facilities in Laboratory of CSCEC for Large and Full Scale Structure Test
Yungui Li, Jianyun Sun, Pengfei Shi*, Wei Li, Yongxi Zhao, Yuting Li
14:00 – 14:20

131. Structural Health Monitoring using Aerial Images taken from Unmanned Aerial Vehicle
14:20 – 14:40

136. Field Investigation for Anchorage Zone of Post-tensioned Box Girder Bridges
Ahmed Farghal Maree*, David Sanders
14:40 – 15:00

147. Road Roughness Evaluation with In-Pavement Sensors
Zhiming Zhang*, Fodan Deng, Ying Huang, Raj Bridgelall
15:00 – 15:20

169. Analysis of Large Amplitude Vibration Mechanism of High-speed Train PRC Girder Bridges Based on Vibration Measurement
Junki Nakasuka*, Tsukasa Mizutani, Yujin Yamamoto, Masato Uchida, Di Su, Tomonori Nagayama
15:20 – 15:40

MS20: Hybrid Simulation and other On-line Testing Techniques
PS1 Saturday, August 1, 14:00 – 15:40

257. Developments and Applications of Large-scale Real-time Hybrid Simulation to Enable Advancements in Performance-based Earthquake Engineering
James Ricles*, Richard Sause, Chinmoy Kolay, Baiping Dong, Tommy Marullo
14:00 – 14:40

260. A New Force-Based Formulation of Equations of Motion for Hybrid Simulation
Bahar Forouzan*, Narutoshi Nakata
14:40 – 15:00
261. Application of Unscented Kalman Filter to Sectional Model Updating in Hybrid Simulation of Frame Structures
Bin Wu*, Yongsheng Chen, Guoshan Xu, Cong Zeng
15:00 – 15:20

263. Hybrid Testing System with General Interfaces to Coordinate Substructures
Tao Wang*, Haoran Jiang, Huimeng Zhou
15:20 – 15:40

RS30: Modeling/Numerical Simulation in Predicting and Interpreting Experimental Results
PS1 Saturday, August 1, 14:00 – 15:40

113. Preliminary Research on the Longitudinal Girder-Pier Collision Issue of Simply-Supported Girder Bridges
Tian-Bo Peng*, Weiya Tang
14:00 – 14:20

128. Research on the Seismic Performance of an External Prestressing Rocking Frame
Xia Liu*, Liang Lu, Xilin Lu
14:20 – 14:40

133. Nonlinear Seismic Analysis of Offshore Reinforced Concrete Bridges
Hong-Nan Li*, Yu Zhang, Gang Li
14:40 – 15:00

142. Experimental and Numerical Analysis Study of a Newly Developed Bridge Railing using Extruded Aluminum-Alloy
Yoshito Itoh*, Akihiro Yoshino, Masashi Sakemi, Ryoichi Sato, Mikihito Hirohata
15:00 – 15:20

145. Shaking Table Experiments of Dry Storage Casks
Ahmed Farghal Maree*, Taylor Nielsen, Sharad Dangol, Joel Parks, David Sanders, Luis Ibarra, Chris Pantelides
15:20 – 15:40
**MS10: Advancements in Nanotechnology-enabled Sensors**
PS1  Saturday, August 1, 14:00 – 15:40

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<td>285.</td>
<td>Electro-Mechanical Sensing Performance of Three Dimensional Graphene Aerogel Multifunctional Composites under Ultra-large Deformations</td>
<td>Qiangqiang Zhang, Hui Li*, Xiang Xu, Yikang Yu</td>
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</table>
PARALLEL SESSION 2 – SATURDAY, AUGUST 1

| MS31: Innovations in Structural Health Monitoring Algorithms | 1310 Newmark  
| PS2  
Saturday, August 1, 16:10 – 17:50  
Co-Chairs: Hongki Jo & Songye Zhu |

267. Parametric Identification of Structures with Unknown Excitations using Quadratic Sum-squares Error with AR Model  
Hongwei Huang*, J.N. Yang  
16:10 – 16:30

269. Condition Assessment of Long Span Cable-stayed Bridges Based Structural Health Monitoring Techniques  
Shunlong Li*, Shaoyang He, Fujian Zhang, Hui Li  
16:30 – 16:50

271. Broadband Dynamic Load Identification using Augmented Kalman Filter  
Babak Khodabandeloo, Hongki Jo*  
16:50 – 17:10

282. An Improved System Identification Approach to Enable Structural Health Monitoring  
Chia-Ming Chang*, Chin-Hsiung Loh  
17:10 – 17:30

299. Strain Response Measurement-based Damage Identification in Building Frame Structures  
Mahendra P. Singh*, Saurabh S. Bisht.  
17:30 – 17:50

| RS74: Structural Health Monitoring | 1311 Newmark  
| PS2  
Saturday, August 1, 16:10 – 17:50  
Co-Chairs: Robin Kim & Di Su |

323. USACE SMART Gate: Structural Health Monitoring to Preserve America’s Critical Infrastructure  
Zachary R. Treece*, Matthew D. Smith, Nicholas E. Wierschem, Steven C. Sweeney, Billie F. Spencer Jr.  
16:10 – 16:30

233. Train Localization by Mutual Correction of Acceleration and Interior Sound  
Di Su*, Satoshi Sano, Tomonori Nagayama, Hirofumi Tanaka, Tsukasa Mizutani  
16:30 – 16:50

234. Fatigue Behavior of Multi-Scale Recycled Aggregate Reinforcement Concrete  
Hui-Qun Yan*, Jiann-Wen Woody Ju, Qing-Yuan Wang  
16:50 – 17:10

235. Fatigue Crack Monitoring using Large-area, Flexible Capacitive Strain Sensors  
Xiangxiong Kong*, Jian Li, Simon Laflamme, Caroline Bennett  
17:10 – 17:30
237. Development of Wireless Gyroscope-free Inertial Measurement Unit
Yang Yang*, Xiong Yu
17:30 – 17:50

RS11: Application of Experimental Results to Structural Design and analysis
PS2 Saturday, August 1, 16:10 – 17:50

143. Behaviour of Concrete-filled Square Section Stub Columns Fabricated from Mild Steel Plates and Incorporating Cold-Formed Tubes at the Vertices
Fidelis R. Mashiri*, Brian Uy, Zhuo Zhao
16:10 – 16:30

195. Experimental Investigations on Shape Memory Alloy Fiber Reinforced Concrete
Evelina Khakimova, Muhammad M. Sherif, Osman E. Ozbulut*, Devin K. Harris, H. Celik Ozyildirim
16:30 – 16:50

249. Simplified Flexural Design of Bolted Side-Plated Beams with Partial Interaction
Ling-Zhi Li*, C.J. Jiang, R.K.L. Su
16:50 – 17:10

202. Experimental Study and Numerical Simulation on Steel Plate Girders with Deep Section
Yiyun Zhu, Jincheng Zhao*
17:10 – 17:30

218. Experimental Study of Reinforced Concrete Grid Structural Walls
Weijing Zhang*, Qian Zhang
17:30 – 17:50

MS60: Wireless and Wired Structural Control
PS2 Saturday, August 1, 16:10 – 17:50

273. Semi-Active Control using MR-Dampers: NCREE Experiences
Chin-Hsiung Loh*, Pei-Yang Lin
16:10 – 16:50

274. Wireless Structural Control Benchmark Problem
Zhuoxiong Sun*, Bo Li, Shirley J. Dyke, Chenyang Lu, Lauren Linderman
16:50 – 17:10

276. Concurrent System Identification and Feedback Control for Adaptive Control of Time Variant Structures using Dual Core Wireless Sensors
Mitsuhiro Hirose, Jerome P. Lynch*
17:10 – 17:30
277. Low-force Semi-active Damper Design for Small-scale Wireless Structural Control Experiments
Benjamin Winter, R. Andrew Swartz*
17:30 – 17:50

RS41: Novel Testing, Measuring, and Monitoring Techniques in Structural Experiments
PS2 Saturday, August 1, 16:10 – 17:50

179. Direct Measurement of Inter-story Drift Displacements of Scale Model Building in Shake Table Tests
Akira Nishitani, Shohei Marutani*, Ping Xiang, Yushiro Hara, Tomohiko Hatada, Ryota Katamura, Kiyoshi Kanekawa, Takashi Tanii
16:10 – 16:30

183. Application of MR Damper in Real-time Structural Damage Detection using Extended Kalman Filter
Chenhao Jin*, Shinae Jang, Xiaorong Sun, Zhaoshou Jiang, Richard Christenson
16:30 – 16:50

211. Vibration Characteristics of Mountable PZT Interface on Tendon Anchorage Connection
Thanh-Canh Huynh*, Kwang-Suk Lee, Jeong-Tae Kim
16:50 – 17:10

197. A Monitoring Method of M-Φ Curve in Plastic Hinge Zone of the RC Structure
Haibin Zhang*, Shuang Hou, Jinping Ou
17:10 – 17:30

209. Image Analysis for Crack Observation of a Cylinder RC Structure Cyclic Test
Yuan-Sen Yang*, Hsuan-Chih Yang, Yu-Chih Chen, Hu-Jhong Lu, Chang-Ching Chang, Chiun-Lin Wu, Thomas T. C. Hsu
17:30 – 17:50
### MS21: Hybrid Simulation and other On-line Testing Techniques

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<tr>
<td>258.</td>
<td>RTHS with Concurrent Model Updating on a Distributed Platform</td>
<td>Ge Ou*, A. Ozdagli, Shirley J. Dyke, A. Prakash</td>
<td>16:30 – 16:50</td>
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<td>259.</td>
<td>Real-time Hybrid Simulation of Multiple Tuned Liquid Column Dampers for Controlling Seismic-Induced Response</td>
<td>Fei Zhu, Jin-Ting Wang*, Feng Jin, Okyay Altay</td>
<td>16:50 – 17:10</td>
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<td>264.</td>
<td>Substructure Real-time Hybrid Simulation with a Small-scale Uni-axial Shake Table</td>
<td>Ruiyang Zhang*, Paige V. Lauenstein, Brian M. Phillips</td>
<td>17:10 – 17:30</td>
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<td>265.</td>
<td>Application of Hybrid Simulation to Investigate the Seismic Behavior of Steel Moment Frame Structures through Collapse</td>
<td>Gilberto Mosqueda*, Maikol Del Carpio Ramos, M. Javad Hashemi</td>
<td>17:30 – 17:50</td>
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### MS40: Modeling/ Numerical Simulation in Predicting and Interpreting Experimental Results

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<tr>
<td>306.</td>
<td>Full-Scale Experimental Seismic Collapse Study of a 4-Story Wood-Frame Building</td>
<td>Pouria Bahmani, John W. van de Lindt*</td>
<td>16:10 – 16:50</td>
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<td>167.</td>
<td>Shear Behavior of Exposed Column Base Plate Connections</td>
<td>Yao Cui*, Hao Liu, Hao Li</td>
<td>16:50 – 17:10</td>
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<td>176.</td>
<td>Dynamic Similitude Mechanism and Design Approaches of the Base-isolated Structures</td>
<td>Xiangxiang Ren, Wensheng Lu*</td>
<td>17:30 – 17:50</td>
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284. Scalable Thin Film Sensor for Damage Detection and Localization
Simon Laflamme*, Austin Downey, C. Sheafe, Daji Qiao, Jian Li
16:10 – 16:30

289. DNA Breath Sensor Array using Molecular Dynamics Simulation
Wenjun Zhang, Yunqing Du, Steven W. Cranford, Ming L. Wang*
16:30 – 16:50

288. Enhancing the Strain Sensitivity of Carbon Nanotube-Polymer Thin Films for Damage Detection and Structural Monitoring
Yingjun Zhao*, Christoph Viechtbauer, Kenneth J. Loh, Martin Schagerl
16:50 – 17:10
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<td>RS12</td>
<td>MS61</td>
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<td>Structural Design</td>
<td>Wireless &amp; Wired Control</td>
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PARALLEL SESSION 3 – SUNDAY, AUGUST 2

RS70: Structural Health Monitoring
PS3 Sunday, August 2, 08:30 – 10:10

106. Multi-Scale Structural Health Monitoring Technologies
You-Lin Xu*, Billie F. Spencer Jr.
8:30 – 8:50

108. Experimental Studies of Two-Stage Covariance-based Multi-sensing Damage Detection Method
Jian-Fu Lin*, You-Lin Xu
8:50 – 9:10

112. Time Evolution of Modal Parameters Identified using WSN Data Collected by Seismic Structural Monitoring of a Monumental Church
Francesco Potenza Marco Lepidi, Umberto Di Sabatino, Vincenzo Gattulli*
9:10 – 9:30

RS75: Structural Health Monitoring
PS3 Sunday, August 2, 08:30 – 10:10

240. Evaluation of Stiffness Reduction of RC Columns During Earthquakes Based on Acceleration Measurements
Yasutaka Narazaki*, Tomonori Nagayama, Di Su
8:30 – 8:50

243. Time-dependent Considerations of I-35W St. Anthony Falls Bridge including Long-term Monitoring Applications
Brock D. Hedegaard*, Catherine E.W. French, Carol K. Shield
8:50 – 9:10

248. Monocular Vision-based Displacement Measurement System Robust to Angle and Distance using Homography
Jun-Hwa Lee*, Soojin Cho, Sung-Han Sim
9:10 – 9:30
251. Finite Element Model Updating of a 4-Story Reinforced Concrete Base-isolated Building Tested at the E-Defense Shaking Table Facility
Wael M. Elhaddad, Patrick T. Brewick, Jessica Barrios Hernandez, Erik A. Johnson*, Eiji Sato, Tomohiro Sasaki
9:30 – 9:50

225. Safety Assessment to Zhuhai Opera House Based on Monitoring Measurements
Jun Teng*, Wei Lu, Rengui Zhang, Yan Cui, H.J. Liu
9:50 – 10:10

RS12: Application of Experimental Results to Structural Design and Analysis
PS3 Sunday, August 2, 08:30 – 10:10

220. Experimental Evaluation of Seismic Residual Performance for Deteriorated Rubber Bearings in Highway Bridges
Kunihiro Hayashi*, Yukio Adachi, Naota Sakamoto, Akira Igarashi, Ji Dang
8:30 – 8:50

201. Full-scale Cyclic Testing of an R = 3 Chevron and R = 3.25 Split-X Braced Frames
Joshua Sizemore*, Larry Fahnestock, Eric Hines, Cameron Bradley
8:50 – 9:10

228. Field Monitoring of Skewed Integral Abutment Bridges
Beth Wright*, James LaFave, Larry Fahnestock, Matthew Jarrett, Joseph Riddle, Jeffrey S. Svatora
9:10 – 9:30

229. Experimental Investigation of the Cyclic Response of Bolted Angles in Gravity Beam-Column Connections for Enhanced Seismic Performance
9:30 – 9:50

232. Vibration Serviceability Analysis of Aluminum Pedestrian Bridges Subjected to Crowd Loading
Pampa Dey*, Sriram Narasimhan, Scott Walbridge
9:50 – 10:10

MS61: Wireless and Wired Structural Control
PS3 Sunday, August 2, 08:30 – 10:10

138. Fragility Analysis of Structures Incorporating Control Systems
Alana Wilbee*, Francisco Pena, Johnny Condori Uribe, Zhuoxiong Sun, Shirley Dyke
8:30 – 8:50
159. Experimental Validation of a Large Capacity Semi-Active Friction Device
Austin Downey, Liang Cao, Simon Laflamme*, Douglas Taylor, James Ricles
8:50 – 9:10

171. Experimental Study of an Innovative Rotating Actuator for Structural Vibration Control
Yu Zhang*, Baowei Cheng, Luyu Li, Xiaohua Zhang
9:10 – 9:30

231. Fuzzy Control of Seismic Structure with an Active Mass Damper
Weijing Zhang*, Xiaofei Liu, Guoshan Xu
9:30 – 9:50

275. Sparse Feedback for Estimation in Wireless Structural Control
Lauren Linderman*
9:50 – 10:10

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<th>2310 Newmark Co-Chairs: Nicholas Wierschem, Joshua Steelman &amp; Zhe Qu</th>
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318. Innovative Multiscale Sensing and Computational Simulations for Bridge Scour Risk Management
Xiong Yu*, Xibao Yu, Junliang Tao, Yuan Guo
8:30 – 9:10

188. Use of a Novel Distributed Fibre Optic Strain Measurement System in the Seismic Retrofit of RC Shear Walls
Joshua Woods*, David Lau, Xiaoyi Bao, Wenhai Li,
9:10 – 9:30

314. Development and Validation of an Experimental Blast Simulation Technique utilizing Shake-table-Produced Ground Motion
Nicholas Wierschem*, Jie Luo, James Wilcoski, Sean A. Hubbard, Larry A. Fahnestock, Billie F. Spencer Jr., D. Michael Mcfarland, D. Dane Quinn, Alexander F. Vakakis, Lawrence A. Bergman
9:30 – 9:50

315. Reference-free Displacements for Condition Assessment of Railroad Bridges
Fernando Moreu*, Jian Li, Hongki Jo, Robin E. Kim, Sandro Scola, Billie F. Spencer, James M. Lafave
9:50 – 10:10
156. Recent Advances on the Hybrid Simulation of Bridges Based on Partitioned Time Integration, Dynamic Identification and Model Updating
Giuseppe Abbiati, Enrico Cazzador, Igor Lanese*, Saeed Eftekhar Azam, Oreste S. Bursi, Alberto Pavese
8:30 – 8:50

178. Development of Adaptive Multi-rate Interface for Real-time Hybrid Simulation
Amin Maghareh*, Jacob Waldboer, Shirley J. Dyke, Arun Prakash, Ali Ozdagli
8:50 – 9:10

215. Development of Integrated Framework for Distributed Multi-platform Simulation
Xu Huang*, V. Sadeghian, Oh-Sung Kwon
9:10 – 9:30

283. FEI Based Online Actuator Tracking Assessment for Real-time Hybrid Simulation
Tong Guo, Weijie Xu*, Cheng Chen
9:30 – 9:50

312. Distributed Real-Time Hybrid Simulation of Base Isolated Buildings Employing the Connected Control Method
M. Avci, F. Peña, Richard E. Christenson*, Shirley J. Dyke, Erik A. Johnson
9:50 – 10:10

146. Effective Viscous Damping Ratio in Seismic Response of Reinforced Concrete Structures
Pedram Khajeh Hesameddin*, Ayhan Irfanoglu, Thomas J. Hacker
8:30 – 8:50

207. Numerical Simulation for Local Stability of Box-Section Columns
Feng Yue*
8:50 – 9:10

208. Seismic Performance Analysis and Design of High-rise Isolated Structures under Very-rare Earthquake
Peisong Wu*, Jinping Ou
9:10 – 9:30

291. Study on Seismic Performance of Damage-Protected Precast Frame
Yun Zou*, Xiao-Ping Feng, Xuan Zhang, Tuan-Wei Bi
9:30 – 9:50
296. On the Study of Thermal Stress Characterization Based on Hole-drilling Test with the Improved Calibration Coefficients
Xuan Zhu*, Francesco Lanza Di Scalea, Mahmood Fateh
9:50 – 10:10

**MS50: Wireless Sensor Technology**
PS3 Sunday, August 2, 08:30 – 10:10

247. Monitoring and Control of Moving Truck Loads to Mitigate Vehicle-induced Bridge Responses using Mobile Truck-based Wireless Sensors
Rui Hou*, Yilan Zhang, Sean O’Connor, Jerome P. Lynch
8:30 – 9:10

200. A Wireless Mobile Sensor Platform for Structural Health Monitoring
Matthew Horner, Kate Koser, Kseniya Korneva, Thomas J. Matarazzo, Shamim N. Pakzad
Presented by S. Golnaz Shahidi
9:10 – 9:30

204. Scour Monitoring at Bridge Sites using Wireless Smart Scour Sensing Posts
Benjamin Winter, Baibhav Rajbhandari, R. Andrew Swartz*
9:30 – 9:50

294. Bridge Natural Frequency Estimation by Extracting the Common Vibration Component from the Responses of Two Vehicles
Tomonori Nagayama*, A. P. Reksowardojo, D. Su, T. Mizutani, C. Zhang
9:50 – 10:10
### PARALLEL SESSION 4 – SUNDAY, AUGUST 2

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<td>Co-Chairs: Jianping Han &amp; Weijing Zhang</td>
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**137. Development of Real-Time Monitoring System for Multi-hazard Bridge**  
Kuo-Chun Chang, Yung-Bin Lin  
Presented by Pei-Ching Chen  
10:40 – 11:00

**151. Sparse Signal Reconstruction for Flaw Detection from Noisy Ultrasonic Data: A Bayesian Framework**  
Biao Wu*, Yong Huang, Hui Li  
11:00 – 11:20

**152. Simple Estimation of Bicycle Lane Condition by using the Dynamic Response of a Bicycle**  
Takahiro Yamaguchi*, Tomonori Nagayama, Di Su  
11:20 – 11:40

**154. Analysis of Time-Frequency Energy for Environmental Vibration Induced by Metro**  
Guangzhen Li, Xiaosong Ren*, Bin Zhang, Gang Zong  
11:40 – 12:00

**161. Damped Hysteretic Resistance Identification of Bouc-Wen Model using Data-based Model-free Nonlinear Approach**  
Seungwook Seok*, Bin Xu, Shirley J. Dyke, Ayhan Irfanoglu  
12:00 – 12:20

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<td>Co-Chairs: Zhongdong Duan &amp; Jong-Woong Park</td>
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**279. Sensor Fusion Technique for Tilt Estimation using a Gyroscope and a Three-axis Accelerometer: Formulation and Validation**  
10:40 – 11:00

**295. On the Study of the Temperature and Stress Stiffening Effects to the Impedance-based Structural Health Monitoring System**  
Xuan Zhu*, Francesco Lanza Di Scalea, Mahmood Fateh  
11:00 – 11:20

**298. Automated Flexibility-based Damage Identification Strategy for Cable Structures**  
Rosana Martinez-Castro*, Shinae Jang  
11:20 – 11:40
305. Infrastructure Condition in Japan and a New R&D Program "Infrastructure Maintenance, Renovation and Management“
Yozo Fujino*
11:40 – 12:00

307. Harvesting Energy from Asphalt Pavements under Moving Load using Imbedded Piezoelectric Patches
Yisheng Chen*, Yangyang Zhang, Chaofeng Lu
12:00 – 12:20

**MS80: Application of Experimental Results to Structural Design and Analysis**

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<tr>
<td>319. Seismic Response and Design of Steel Building Structures with X-braced Frames of the Conventional Construction Category</td>
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Robert Tremblay*
10:40 – 11:20

189. Evaluation of ASCE 7-10 Wind Velocity Pressure Coefficients on the Components and Cladding of Low-rise Buildings using Modern Wind Tunnel Testing Data
Matthew Gierson*, Brian Phillips, Dat Duthinh
11:20 – 11:40

222. Aerodynamic Control of Wind-Induced Vibrations and Flow around Super-Tall Buildings
Yukio Tamura*, Hideki Tanaka, Kazuo Ohtake, Yongchul Kim, Akihito Yoshida, Eswara Kumar Bandi, Xiaoda Xu, Qingshan Yang
11:40 – 12:00

239. Shaking Table Tests on Collapse Patterns of Eight Multi-story Buildings with Different Structures
Junwu Dai*, Yongqiang Yang, Ruochen Shan, Song Cui
12:00 – 12:20

**RS61: Structural Control**

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<td>182. Pounding-induced Stress Wave Analysis and Mitigation of Highway Bridges under Earthquakes</td>
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Suchao Li*, Anxin Guo, Lili Cui, Chenxi Mao, Hui Li
10:40 – 11:00

135. A Generalized Constitutive Model for Elastomeric Bearings
Wei Wei*, Yong Yuan
11:00 – 11:20
198. Shake Table Test of a Cable-Stayed Bridge using Yielding Steel Dampers
Yan Xu*, Ruilong Wang, Jianzhong Li
11:20 – 11:40

214. Outrigger Tuned Viscous Mass Damping System for High-rise Buildings Subject to Earthquake Loadings
Takehiko Asai*, Kohju Ikago, Yoshikazu Araki
11:40 – 12:00

224. Field Validation on Vibration Control of a Cable-Stayed Footbridge with Tuned Mass Dampers
Qing Wen*, Xu-Gang Hua, Zheng-Qing Chen
12:00 – 12:20

RS42: Novel Testing, Measuring, and Monitoring Techniques in Structural Experiments
PS4 Sunday, August 2, 10:40 – 12:20

155. Multi-spot Laser Scanning Thermography for Delamination Inspection in CFRP/GFRP Structure
Soonkyu Hwang*, Jaemook Choi, Jinyeol Yang, Hoon Sohn
10:40 – 11:00

187. Mixed Force and Displacement Control for Testing of Base-isolation Bearings in Real-Time Hybrid Simulation
Matthew Stehman, Richard Erb, Narutoshi Nakata*
11:00 – 11:20

217. Alternative Acceleration Performance Assessment Method for Seismic Shaking Tables
Pei-Ching Chen*, Chin-Ta Lai
11:20 – 11:40

219. Image-based Bolt-Loosening Detection Technique of Bolt Joint in Steel Bridges
Jae-Hyung Park, Tae-Hwan Kim, Jeong-Tae Kim*
11:40 – 12:00

236. Displacement Measurement of Burr Arch-Truss under Dynamic Loading Based on Image Processing Technology
Yang Yang*, Xiong Yu, Kamil Nizamiev, Dario Gasparini
12:00 – 12:20
### RS20: Hybrid Simulation and other On-line Testing Techniques

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<td>158. Development of Hybrid Simulation System for Multi-Degree-of-Freedom Large-scale Testing</td>
<td>Mohamed Moustafa*, Khalid Mosalam</td>
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<tr>
<td>177. Multi-modal Shaking Table Testing for Inner-Skin Curtain Wall System of Shanghai Tower</td>
<td>Yangling Wang*, Wensheng Lu, Khalid M. Mosalam</td>
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<tr>
<td>180. Real-time Hybrid Testing on a Girder Bridge Model by using Shaking-Table and Actuator</td>
<td>Cheng-Yu Yang*, Gao-Jie Dong, Xiao-Song Ren, Shawn You, Andreas Schellenberg</td>
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<td>216. Development of 10-Element Hybrid Simulator and its Application to Seismic Performance Assessment of Structures with Hysteretic Energy Dissipative Braces</td>
<td>Saeid Mojiri*, Oh-Sung Kwon, Constantin Christopoulos</td>
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<tr>
<td>303. Equivalent Force Control for Real-time Hybrid Simulation with Physical Substructures dependent on both Velocity and Displacement</td>
<td>Huimeng Zhou*, Bin Wu, Tao Wang, David Wagg, M. Li, Junwu Dai</td>
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### RS32: Modeling/Numerical Simulation in Predicting and Interpreting Experimental Results

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<td>297. Fast Bayesian Model Selection with Application to Large Locally-Nonlinear Dynamic Systems</td>
<td>Subhayan De*, Erik Johnson, Steven Wojtkiewicz</td>
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<td>316. Floor Slab Isolation for Mitigating the Seismic Response of Building Systems</td>
<td>Hussam Mahmoud, Akshat Chulahwat*</td>
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<tr>
<td>331. Development and Numerical Simulation of Sub-structural Shaking Table Testing Framework Considering Soil/Fluid – Structure Coupling Effects</td>
<td>Ning Li*, Z.X. Li, Billie F. Spencer Jr</td>
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335. Simplified Calculation of Plastic Energy Dissipation of MDOF System using Force Analogy Method
Ji-Ting Qu*, Yu Shu
12:00 – 12:20

**MS70: Smart Materials for Sensors and Actuators**
PS4 Sunday, August 2, 10:40 – 12:20

309. Achievement of Extreme and Reversed Values of Physical Properties
Roderic Lakes*
10:40 – 11:20

160. Interface Debonding Detection for an Irregular Complex Multi-Chamber Steel Reinforced Concrete Column with PZT Measurements
Bin Xu*, Zhen Li, Shirley J. Dyke
11:20 – 11:40

174. Experimental Investigation on Ni-Ti Shape Memory Alloy Samples
Fabio Casciati, Sara Casciati, Lucia Faravelli, Michele Vece*
11:40 – 12:00

308. Tension-Induced Tunable Corrugation in Two-phase Composite Materials: Mechanisms and Implications
Qianli Chen, Ahmed Elbanna*
12:00 – 12:20
PARALLEL SESSION 5 – SUNDAY, AUGUST 2

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<td>Co-Chairs: Tomonori Nagayama &amp; Fernando Moreu</td>
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163. Corrosion Damage Mechanism Identification for Bridge Cable using Pattern Recognition of Acoustic Emission Feature  
Dongsheng Li*, Pingguang Wang, Jinping Ou  
13:30 – 13:50

168. Mode Identifiability of a Multi-Span Cable-Stayed Bridge utilizing Stochastic Subspace Identification  
Yoshinao Goi*, Chul-Woo Kim  
13:50 – 14:10

172. Experimental Investigation of a Kriging Surrogate-based Finite Element Model Updating Method for Bridge Structures  
Ho-Yeon Jung, Jung-Hoon Lee, Seung-Seop Jin, Hyung-Jo Jung*  
14:10 – 14:30

175. Bridge Scour Monitoring using Extended Kalman Filter  
Rajendra Prasath Palanisamy*, Sung-Han Sim  
14:30 – 14:50

254. Consequence-based Management of Railroad Bridge Networks  
Fernando Moreu*, Billie F. Spencer Jr., Douglas A. Foutch, Sandro Scola  
14:50 – 15:10

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<td>Co-Chairs: Ryan Giles &amp; Chung-Bang Yun</td>
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320. Application of Statistical Process Control Methods to Strain Data from a Historic Steel Truss Swing Bridge  
Ryan K. Giles*, Billie F. Spencer Jr., Carol K. Shield, Steven Sweeney  
13:30 – 13:50

322. Modal Parameter Identification of Structures based on Combining Autocorrelation Function and ERA under Ambient Excitation  
Jianping Han*, Pengqiang An  
13:50 – 14:10

324. A New Stochastic Approach of Vehicle Pavement Interaction  
Robin E. Kim*, Seung Gu Kang, Billie F. Spencer Jr., Imad Al-Qadi, Hasan Ozer  
14:10 – 14:30
327. Automated Dynamic Displacement Estimation using Accelerometer for a Railway Bridge
Fernando Gomez*, Jongwoong Park, Billie F. Spencer Jr.
14:30 – 14:50

RS13: Application of Experimental Results to Structural Design and Analysis
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304. Experimental Study on the Seismic and Power-generation Performance of RC Shear Wall with PV Panel Attached
Hongmei Zhang*, Xilin Lu
13:30 – 13:50

325. Failure Pattern of Double-layer Lattice Structure and its Experimental Studies with Isolated Supports
Gui-Bo Nie*, Junwu Dai, Xu-Dong Zhi, Feng Fan
13:50 – 14:10

326. Experimental Study on Behavior of CFRP-strengthened Circular Hollow Section Gap K-joints
Yuguang Fu*, Lewei Tong
14:10 – 14:30

RS62: Structural Control
PS5 Sunday, August 2, 13:30 – 15:10

Kohju Ikago*, Norio Inoue
13:30 – 13:50

255. Experimental Verification of a Universal Formula on Damping Enhancement for Long Stay Cables with External Dampers
Yuan-Feng Duan*, Xiao-Wei Liao, Billie F. Spencer Jr.
13:50 – 14:10

310. Magnetic Negative Stiffness Damper and its Application on Stay Cable
Xiang Shi*, Songye Zhu
14:10 – 14:30

329. Phenomenological Modeling of Magneto-rheological Elastomer
Qi Wang*, Xufeng Dong, Luyu Li, Yu Tong, Jinping Ou
14:30 – 14:50

332. Preliminary Analysis of using Inertial Mass Damper to Mitigate the Cable Vibration
Lei Lu*, Yuan-Feng Duan, Billie F. Spencer Jr., Xilin Lu, Ying Zhou
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RS43: Novel Testing, Measuring, and Monitoring Techniques in Structural Experiments
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212. FBG-based Tendon Force Monitoring and Temperature Effect Estimation in Prestressed Concrete Girder
Thanh-Canh Huynh*, Tuan-Cuong Nguyen, Tae-Hwan Kim, Jeong-Tae Kim
13:30 – 13:50

242. A Uniform Method to Integrate Testing Equipment for Large Scale Quasi-Static Structural Testing
Kung-Juin Wang*, Keh-Chyuan Tsai
13:50 – 14:10

250. Study on Shear Performance and Residual Shear Strength of Concrete Members after Fire
Changjiu Jiang*, Zhoudao Lu, Lingzhi Li, Jiehong Liao
14:10 – 14:30

252. Robotic Aerial-imaging and Ground-sensing Network for use in Emergency Response
Zhiqiang Chen*, Jianfei Chen, Caleb Chase
14:30 – 14:50

302. A New Paradigm for Testing Granular Materials: Discrete Element Computation with Real Particles
Yvette Holguin*, Ahmed Elbanna
14:50 – 15:10

RS78: Structural Health Monitoring
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321. Improved Time-domain Modal Parameter Identification Algorithm in Noisy Environment by Using Sparsity Representation
Hong Zheng, Zhongdong Duan*
13:30 – 13:50

328. Structural Damage Estimation of Cracked Concrete Beams
Manuel E. Ruiz-Sandoval*, G. Juarez
13:50 – 14:10

333. Risk-based Maintenance using a New Method for Deriving Analytical Seismic Fragility Curves
Do-Soo Moon*, Young-Joo Lee
14:10 – 14:30

334. Development of a High-Fidelity Sensor Board with 24-bits of Resolution for Structural Health Monitoring
Martha Cuenca*, Billie F. Spencer Jr., Hongki Jo, Jong-Woong Park, Kirill Mechitov
14:30 – 14:50

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