

PROGRAM

# 5WCSCM

Fifth World Conference on  
Structural Control and Monitoring



**12 - 14 JULY 2010**

**KEIO PLAZA HOTEL  
SHINJUKU, TOKYO**



## **Sponsoring Associations**

International Association for Structural Control and Monitoring (IASCM)  
157 Vibration Control Committee, Japan Society for the Promotion of Science (JSPS)  
The Asia-Pacific Network of Centers for Research in Smart Structure Technology (ANCRiSST)  
The Kajima Foundation

## **Supporting Associations**

Architectural Institute of Japan (AIJ)  
Japan Society of Civil Engineers (JSCE)  
Japan Society of Mechanical Engineers (JSME)  
Japan Society of Steel Construction (JSSC)  
Japan Association of Earthquake Engineering (JAEE)  
Japan Association of Wind Engineering (JAWE)  
American Society of Civil Engineers (ASCE)

## **Official Journal**

Participants in the 5WCSCM are strongly encouraged to publish full-length versions of their research in the Wiley Journal of Structural Control and Health Monitoring, which is the official journal of the International Association for Structural Control and Monitoring.

Takuji Kobori Memorial Issue is published associated with the 5WCSCM.

Special Issue: Takuji Kobori Memorial Issue edited by Yozo Fujino, Akira Nishitani

Volume 16 Issue 7-8, Pages 687 - 869 (November - December 2009)

<http://www3.interscience.wiley.com/journal/123193167/issue>

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## **Conference Information**

The world conference on structural control and monitoring will be held in Tokyo for the first time in 12 years. The second WCSC, which was held in Kyoto and Tokyo in 1998, is still remembered by many scientists and engineers as the milestone which motivated many people to create a brave new world with this technology. The conference collective interest was focused on active vibration control, passive energy dissipation devices and sensor technologies at that time. Later on, structural health monitoring became the major application field where a wide variety of elemental technologies assembled and crystallized as a new engineering category. In the year 2010, Japan will host the conference again to revitalize the power of science and technology to open the second chapter in this field of engineering. We all have high expectations for the new generation to join us to interact and exchange ideas and experiences to benefit our future society. We hope that the conference will serve as the international forum to achieve this goal.

Keynote lectures by prominent researchers, organized sessions and special events for graduate students and young researchers, as well as technical tours have been prepared. This conference is organized by the International Association of Structural Control and Monitoring together with the local organizing committee and is supported by the Japan Society of Promotion of Science and the Asia-Pacific Network of Centers for Research in Smart Structure Technology (ANCRiSST).

We heartily welcome your participation in the 5th WCSCM.

**Prof. Yozo Fujino**

**Prof. Akira Nishitani**

*The Chairpersons of the 5th WCSCM*

**Prof. Akira Mita**

**Prof. Isao Nishimura**

*The Secretary Generals of the 5th WCSCM*

## Conference Venue

### Keio Plaza Hotel

2-2-1 Nishi Shinjuku, Shinjuku-ku, Tokyo 160-8330, Japan

<http://www.keioplaza.com/>

## Conference Language

English

## Registration Fees

Regular	JPY 70,000
Student	JPY 30,000
Accompanying Person	JPY 30,000

Regular and Student fee includes: reception; banquet; three lunches; coffee breaks; the conference proceedings in USB memory.

Accompanying Person fee includes: reception; banquet; three lunches; coffee breaks.

## Reception

July 12 (Monday): The Reception will be held in Eminence Hall, Keio Plaza Hotel on the fifth floor starting at 18:10.

## Banquet

July 13 (Tuesday): The conference committee has arranged the banquet on a boat that will cruise around Tokyo Bay. Please come to the main entrance of the Keio Plaza Hotel, third floor by **17:40** on July 13 (please be on time). Shuttle buses will take you to the pier. We will provide return transportation from the Banquet to the Keio Plaza Hotel.

## Technical Tour

If you plan to join the technical tour on July 15, please reconfirm your reservation at the registration desk.

## Internet Access

Wireless Internet access will be available. The information on SSID and password will be provided at the registration desk.

## Official Website

<http://www.wcscm5.com/>

## Contact Information

5WCSCM Secretariat

E-mail: [secretary@wcscm5.com](mailto:secretary@wcscm5.com)

## Registration Desk

Keio Plaza Hotel, fourth floor, in front of Ohgi Room

Opening Hours: Monday July 12, 07:30-18:00

Tuesday July 13, 08:00-17:30

Wednesday July 14, 08:00-17:30

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# Program Overview

## Monday 12th July

	Fuji (42F)	Sagami (42F)	Tsukui (42F)	Mitake (42F)	Musashi (42F)	Tama (42F)
8:30 - 8:50	<i>Opening Ceremony *Ohgi (4F)</i>					
8:50 - 9:10	<i>Housner &amp; Kobori Special Session *Ohgi (4F)</i>					
9:10 - 10:10	<i>Keynote 1: James Brownjohn *Ohgi (4F)</i> <i>Keynote 2: Masayoshi Nakashima *Ohgi (4F)</i>					
10:00 - 10:40	<i>Coffee Break *Takao (42F)</i>					
	<i>Parallel Sessions 1</i>					
10:40 - 12:20	A-1: (OS) Wireless Structural Health Monitoring Full Scale Applications 1	B-1: (OS) Verification of Structural Control by Observation Records 1	C-1: (OS) Adaptive Passive Stiffness and Damping Systems	D-1: Damage Evaluation 1	E-1: Multi-purpose Systems	F-1: Experimental Study on Buildings
12:20 - 13:40	<i>Lunch *Moon Light, Orion, Commet, Subaru, Star Light (43F)</i>					
13:40 - 14:10	<i>Keynote 3: Yoshihiro Suda *Ohgi (4F)</i>					
	<i>Parallel Sessions 2</i>					
14:10 - 15:50	A-2: (OS) Wireless Structural Health Monitoring Full Scale Applications 2	B-2: (OS) Verification of Structural Control by Observation Records 2	C-2: (OS) Seismic Safety of Bridges with Response Control Technologies	D-2: Damage Evaluation 2	E-2: System Identification of Civil Engineering Structures	F-2: Seismic Retrofit
15:50 - 16:20	<i>Coffee Break *Takao (42F)</i>					
	<i>Parallel Sessions 3</i>					
16:20 - 18:00	A-3: (OS) Structural Monitoring and Vibration Control at E-Defense	B-3: (OS) Advances in System Identification and SHM	C-3: (OS) Large-Scale and Decentralized Structural Control	D-3: (OS) Monitoring of Wind-Induced Responses of Buildings and Structures and Modal Identification	E-3: Detection, Recognition and Identification	F-3: Passive Vibration Control
18:10 - 20:00	<i>Reception (Eminence Hall (5F))</i>					

## Tuesday 13th July

	Fuji (42F)	Sagami (42F)	Tsukui (42F)	Mitake (42F)	Musashi (42F)	Tama (42F)
8:30 - 9:30	<i>Keynote 4: Toru Kobori *Ohgi (4F)</i> <i>Keynote 5: Fu-lin Zhou *Ohgi (4F)</i>					
9:30 - 10:00	<i>Coffee Break *Takao (42F)</i>					
	<i>Parallel Sessions 4</i>					
10:00 - 11:40	A-4: (OS) Bio-inspired Sensing and Bio-inspired Actuation	B-4: (OS) Advanced Structural Health Monitoring for Buildings 1	C-4: (OS) Semiactive Control of Structures 1	D-4: (OS) Application of System Identification for Real Structures 1	E-4: Assesment	F-4: Modeling and Optimization
11:40 - 13:00	<i>Lunch *Moon Light, Orion, Commet, Subaru, Star Light (43F)</i>					
13:00 - 13:30	<i>Keynote 6: Alison Flatau *Ohgi (4F)</i>					
	<i>Parallel Sessions 5</i>					
13:30 - 15:10	A-5: (OS) Time Frequency Methods in Strucrtal Health Monitoring	B-5: (OS) Advanced Structural Health Monitoring for Buildings 2	C-5: (OS) Semiactive Control of Structures 2	D-5: (OS) Application of System Identification for Real Structures 2	E-5: Sensor System	F-5: Control Application 1
15:10 - 15:40	<i>Coffee Break *Takao (42F)</i>					
	<i>Parallel Sessions 6</i>					
15:40 - 17:20	A-6: (OS) Vibration-Based Energy Harvesting	B-6: (OS) Data Informatics for SHM	C-6: (OS) Advances in Structural Control	D-6: (OS) Structural Health Monitoring of Highway Bridges	E-6: Sensing Technology	F-6: Control Application 2
18:00 - 21:00	<i>Banquet (Please come to the main entrance by 17:40.)</i>					

## Wednesday 14th July

	Fuji (42F)	Sagami (42F)	Tsukui (42F)	Mitake (42F)	Musashi (42F)	Tama (42F)
8:30 - 9:30	<i>Keynote 7: Satish Nagarajaiah *Ohgi (4F)</i> <i>Keynote 8: Christian Boller *Ohgi (4F)</i>					
9:30 - 10:00	<i>Coffee Break *Takao (42F)</i>					
	<i>Parallel Sessions 7</i>					
10:00 - 11:40	A-7: (OS) International Collaborative Projects	B-7: (OS) Advances in Mechatronics	C-7: (OS) Base-Isolated Bridges	D-7: Methods of Structural Health Monitoring	E-7: Passive and Semi-Active Control Systems	F-7: Novel Mass Dampers
11:40 - 13:00	<i>Lunch *Moon Light, Orion, Commet, Subaru, Star Light (43F)</i>					
	<i>Parallel Sessions 8</i>					
13:00 - 14:40	A-8: (OS) Multifunctional Materials for Smart Structure Applications	B-8: (OS) Hybrid Simulation of Large Structural Systems and MR Dampers	C-8: Advanced Damage Detection Method	D-8: System Identification of Buildings	E-8: Structural Control Device	F-8: Active and Semi-Active Mass Damper
14:40 - 15:10	<i>Coffee Break *Takao (42F)</i>					
	<i>Parallel Sessions 9</i>					
15:10 - 16:50	A-9: Vibration Analysis and Control		C-9: Monitoring of Structural Performance	D-9: System Identification of Structures	E-9: Rubber Bearings and Metal Rubbers	F-9: Response Control
16:50 - 17:20	<i>Closing Ceremony *Fuji (42F)</i>					

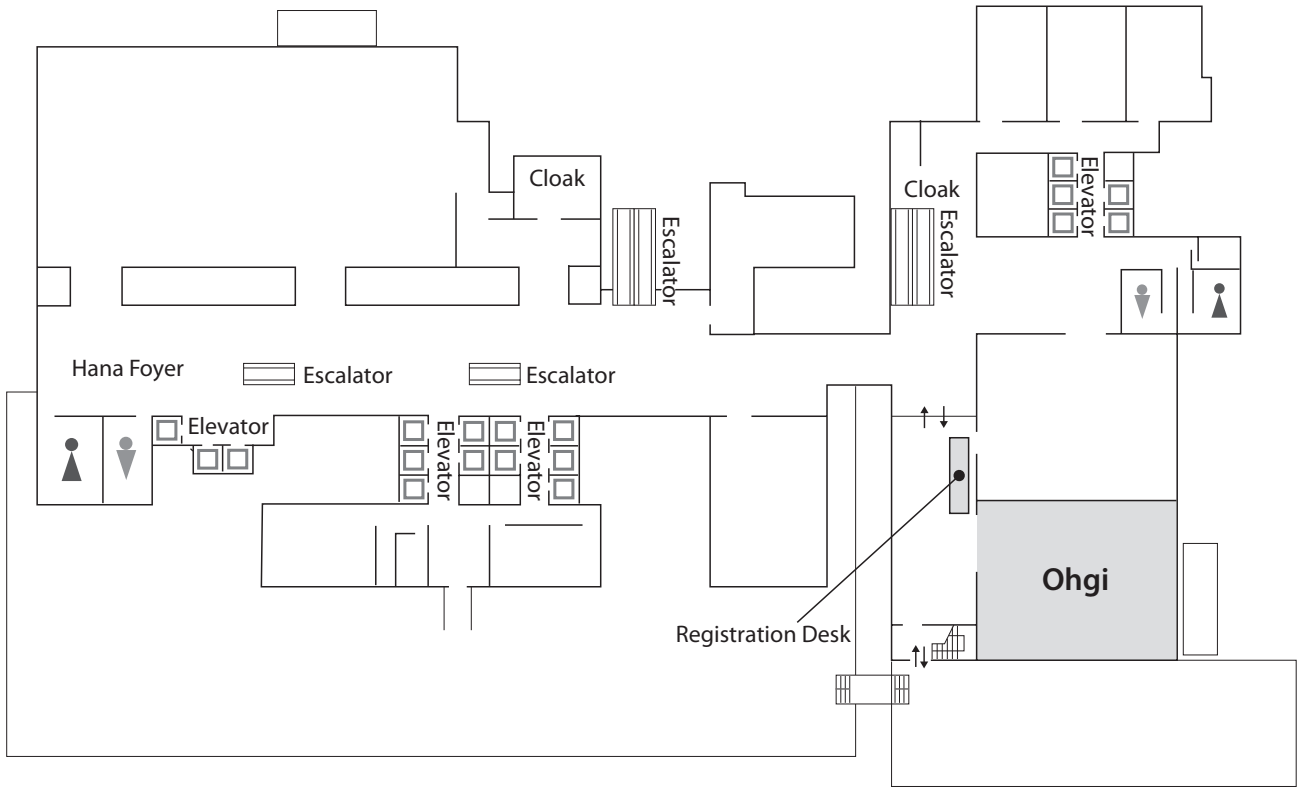
## Thursday 15th July

<i>Technical Tour</i>						
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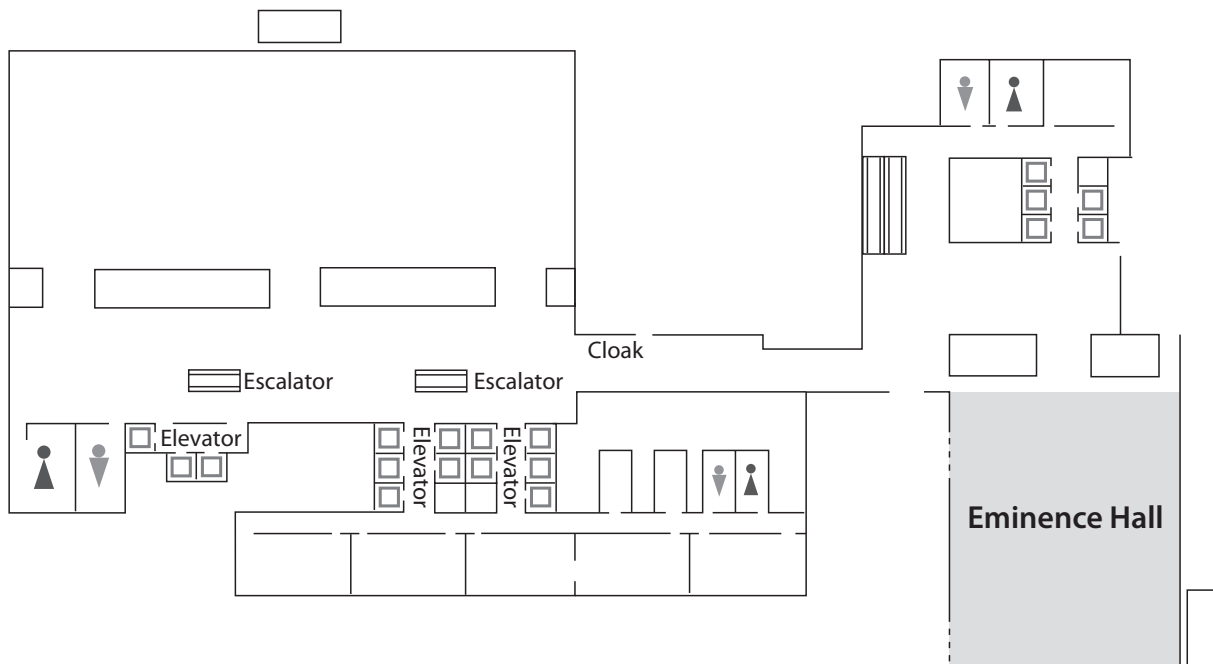
# Floor Plan

## The Keio Plaza Hotel Tokyo

4F



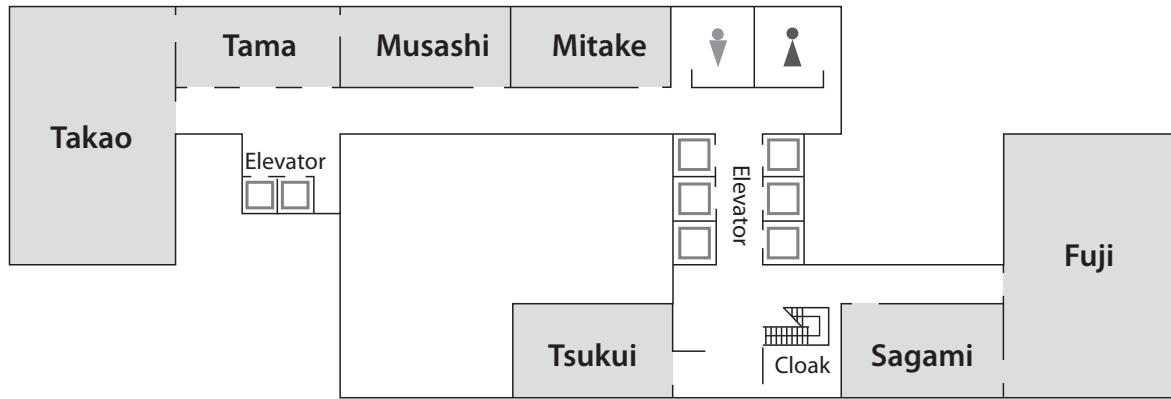
5F



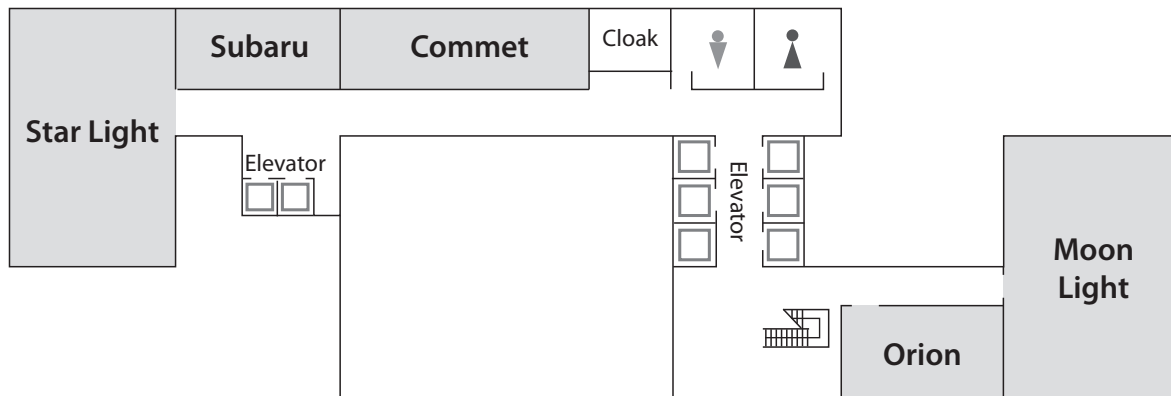
# Floor Plan

## The Keio Plaza Hotel Tokyo

42F



43F



# **Technical Program**

Monday, July 12

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## **Opening Ceremony**

8:30-8:50 Ohgi (4F)

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## **Housner & Kobori Special Session**

8:50-9:10 Ohgi (4F)

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## **Keynote 1&2**

9:10-10:10 Ohgi (4F)

- K-1** STRUCTURAL HEALTH MONITORING AND REAL-TIME PERFORMANCE DIAGNOSIS OF LANDMARK STRUCTURES IN THE UK  
J. Brownjohn, K-Y Koo
- K-2** ROLES OF LARGE-SCALE SHAKING TABLE TESTING FOR VERIFICATION OF ADVANCED TECHNOLOGIES ON STRUCTURAL CONTROL AND MONITORING  
M. Nakashima, X. Ji, D.G. Lignos

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## **Coffee Break**

10:10-10:40 Takao (42F)

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## **A-1: (OS) Wireless Structural Health Monitoring Full Scale Applications 1**

10:40-12:20 Fuji (42F)

*Co-Chair:* B. F. Spencer, Jr., *Co-Chair:* T. Nagayama

- 011** WIRELESS SENSOR NETWORKS FOR UNDERGROUND RAILWAY APPLICATION AND NETWORK TOPOLOGY AND PERFORMANCE  
K. Abe, Y. Kobayashi, C. Hirai, K. Soga, I. Wassell
- 012** DECENTRALIZED STOCHASTIC MODAL IDENTIFICATION USING HIGH SENSITIVITY WIRELESS SMART SENSORS  
H. Jo, S. Sim, T. Nagayama, B.F. Spencer, Jr.
- 013** APPLICATION OF UBIQUITOUS STRUCTURAL MONITORING SYSTEM BY WIRELESS SENSOR NETWORKS TO ACTUAL HIGH-RISE BUILDING  
N. Kurata, M. Suzuki, S. Saruwatari, H. Morikawa
- 014** IMPEDANCE-BASED STRUCTURAL HEALTH MONITORING INCORPORATING AUTONOMOUS FREQUENCY RANGE SELECTION USING ARTIFICIAL NEURAL NETWORK  
J. Min, C-B. Yun, S. Park, H. Shim
- 015** VIBRATION MEASUREMENT TESTS FOR SMART SENSOR IMOTE2 AT LOW TEMPERATURE ENVIRONMENT  
Y. Miyamori, K. Ban, T. Yamazaki, S. Mikami, T. Oshima

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## **B-1: (OS) Verification of Structural Control by Observation Records 1**

10:40-12:20 Sagami (42F)

*Co-Chair: H. Jung, Co-Chair: H. Fujitani*

- 056** VERIFICATION OF STRUCTURAL CONTROL BY OBSERVATION RECORDS  
Y. Ikeda, I. Nagashima, H. Fujitani
- 057** VERIFICATION OF HMD SYSTEM APPLIED TO 36 STORY HIGH-RISE BUILDING BASED ON LONG-TERM WIND AND EARTHQUAKE OBSERVATION DATA  
I. Nagashima, R. Maseki, T. Aihara
- 058** RESPONSE CONTROL PERFORMANCE OF ACTIVE MASS DAMPER USING VARIABLE GAIN CONTROL SYSTEM APPLIED TO SUPER-HIGH-RISE BUILDING  
T. Ishioka, M. Watakabe, S. Inai, T. Yamamoto, O. Chiba
- 059** PERFORMANCE VALIDATION OF AMD SYSTEM IN ACTUAL HIGH-RISE BUILDING IN KOREA  
H. J. Jung, D.D. Jang, H.B. Shim, S.J. Park
- 060** CONTROL EFFECT OF SEMI-ACTIVE ON/OFF OIL DAMPER INSTALLED IN ACTUAL HIGH-RISE BUILDING FOR LARGE EARTHQUAKES AND STRONG WINDS  
H. Kurino, S. Orui, K. Shimizu

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## **C-1: (OS) Adaptive Passive Stiffness and Damping Systems**

10:40-12:20 Tsukui (42F)

*Co-Chair: S. Nagarajaiah, Co-Chair: H. Iemura*

- 101** THEORETICAL, NUMERICAL AND EXPERIMENTAL VERIFICATION OF NEGATIVE STIFFNESS DAMPERS  
H. Iemura, A. Igarashi, A. Toyooka, M. Higuchi, O. Kouchiyama
- 102** STRUCTURAL CONTROL AND DAMAGE MONITORING USING CRACK WIDTH MEASUREMENTS  
Julie M. Heiser, L. Sebastian Bryson, Matthew W. Weekly
- 103** ADAPTIVE NEGATIVE STIFFNESS: A NEW STRUCTURAL MODIFICATION APPROACH FOR SEISMIC PROTECTION  
S. Nagarajaiah, A.M. Reinhorn, M.C. Constantinou, D. Taylor, D.T.R. Pasala, A.A.S. Sarlis
- 104** A DESIGN OF TALL BUILDING WITH SEMI-ACTIVE BASE-ISOLATION SYSTEM  
J. Toyama, Y. Shinozaki, O. Hosozawa, I. Nagashima, R. Maseki
- 105** EXPERIMENTAL STUDIES ON CONTROL STRATEGIES FOR STEEL FRAMES WITH MR DAMPERS FOR EARTHQUAKE HAZARD REDUCTION  
Yunbyeong Chae, James M. Ricles, Richard Sause, Baiping Dong, Cheng Chen, Ricard E. Christenson, Shirley J. Dyke, Anil Agrawal, B.F. Spencer

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## D-1: Damage Evaluation 1

10:40-12:20 Mitake (42F)

*Co-Chair: A. A. Khan, Co-Chair: H. Uno*

- 146 DISTRIBUTED FIBER OPTIC TEMPERATURE SENSORS FOR LEAKAGE DETECTION IN HYDRAULIC STRUCTURES  
A.A. Khan, P. Cunat, Y.L. Beck, J.I. Mars, V.Vrabie, J-P. Fabre
- 147 FAULT DETECTION IN HYSTERETIC BASE-ISOLATION SYSTEMS VIA A SEISMIC DISTURBANCE OBSERVER  
A. Rodríguez, Y. Vidal, L. Acho, F. Pozo
- 148 DAMAGE DIAGNOSIS OF A SHEAR BUILDING VIA SUB-STRUCTURAL TIME SERIES  
W.C. Su, C.S. Huang, L.J. Chen, W.J. Lin
- 149 SEISMIC BEHAVIOR OF A BRIDGES DUE TO GIRDER ELONGATION AND SHRINKAGE CAUSED BY TEMPERATURE CHANGES  
H. Uno, T. Mazda, H. Miyamoto, K. Yunoki, S. Chou, R. Shinoda
- 150 ARTIFICIAL NEURAL NETWORKS FOR DAMAGE ASSESSMENT USING MODAL PARAMETERS  
S.J.S. Hakim, H. Abdul Razak

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## E-1: Multi-purpose Systems

10:40-12:20 Musashi (42F)

*Co-Chair: F. Carlo. Ponzio, Co-Chair: K. Seto*

- 191 MULTI-FUNCTIONAL SYSTEM FOR ESTIMATING TENSION FORCE AND MITIGATING VIBRATION OF STAY CABLE  
I.H. Kim, J.W. Park, H.J. Jung, J.H. Koo
- 192 A FAST METHOD FOR STRUCTURAL HEALTH MONITORING OF STRATEGIC BUILDINGS  
F.C. Ponzio, G. Auletta, R. Ditommaso
- 193 HYBRID SIMULATION WITH MULTIPLE SUPPORT EXCITATION  
J. Li, B.F. Spencer Jr., A.S. Elnashai, B.M. Phillips
- 194 DEVELOPMENT OF SEISMOMETER-TYPE ABSOLUTE DISPLACEMENT SENSOR AIMED FOR DETECTING EARTHQUAKE WAVES WITH LARGE MAGNITUDE AND LONG PERIOD  
K. Seto, Y. Iwasaki, A. Ito, I. Shimoda
- 195 MULTI-OBJECTIVE OPTIMAL PLACEMENTS OF ACTUATORS AND SENSORS WITHIN 3-D STRUCTURES  
Y.-J. Cha, A.K. Agrawal, Y. Kim

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## F-1: Experimental Study on Buildings

10:40-12:20 Tama (42F)

*Co-Chair: X. Ji, Co-Chair: Y. Nitta*

- 236 AN OPTICAL LATERAL-DISPLACEMENT SENSOR FOR MEASURING THE INTER-STORY OF A BUILDING  
Iwao Matsuya, Ryota Tomishi, Maya Sato, Kiyoshi Kanekawa, Tomohiko Hatada, Yoshihiro Nitta, Takashi Tanii, Shuichi Shoji, Akira Nishitani, Iwao Ohdomari
- 237 SEISMIC DAMAGE DETECTION OF A FULL-SCALE SHAKING TABLE TEST STRUCTURE  
X. Ji, G.L. Fenves, K. Kajiwara, M. Nakashima
- 238 DAMAGE DETECTION OF BEAM-COLUMN JOINT IN FULL-SCALE MODEL BUILDING EXPERIMENTS  
Y. Nitta, A. Nishitani, T. Nagae, X. Ji, M. Nakashima
- 239 DEVELOPMENT OF PSEUDO-3D POSITION MEASUREMENT WITH HIGH RESOLUTION CAMERA AND ITS APPLICATION FOR STRAIN MEASUREMENT OF STATIC FORCED WOODEN-WALLS  
Takaaki Iizuka, Tadashi Mikoshiba, Yasushi Niitsu
- 240 INFLUENCE OF VIBRATION METHODS, STRUCTURAL COMPONENTS AND EXCITATION AMPLITUDE ON MODAL PARAMETERS OF LOW-RISE BUILDING  
T.H. Le, S. Nakata, A. Yoshida, S. Kiriya, S. Naito, Y. Tamura

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Lunch

12:20-13:40

Moon Light, Orion, Commet, Subaru, Star Light (43F)

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## Keynote 3

13:40-14:10 Ohgi (4F)

- K-3 CHALLENGE TO STUDY ON VEHICLE SYSTEMS BY FULL SCALE EXPERIMENTS  
Y. Suda

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## A-2: (OS) Wireless Structural Health Monitoring Full Scale Applications 2

14:10-15:50 Fuji (42F)

*Co-Chair: T. Nagayama, Co-Chair: B. F. Spencer, Jr.*

- 016 DEVELOPMENT OF SENSOR NODE AND ANALYTICAL FRAMEWORK FOR VIBRATION-BASED STRUCTURAL HEALTH MONITORING OF EXISTING BRIDGES  
T. Miyashita, M. Nagai
- 017 EFFICIENT MULTIHOP DATA TRANSPORT PROTOCOL FOR STRUCTURAL HEALTH MONITORING AND ITS EVALUATION AT A FULL-SCALE BRIDGE  
T. Nagayama, M. Ushita, Y. Fujino
- 018 RAPID BRIDGE ASSESSMENT ENABLED BY WIRELESS SMART SENSORS  
J.A. Rice, S. Valdovinos, M. DeFino, B.F. Spencer, Jr.

**019** STRUCTURAL HEALTH MONITORING SYSTEM APPLIED TO RC BUILDINGS WITH SMART SENSORS AND WIRELESS NETWORK

K. En, M. Nakamura, T. Yanase, S. Ikegaya, K. Yoneyama

**020** LONG-TERM STRUCTURAL HEALTH MONITORING SYSTEM OF A CABLE-STAYED BRIDGE BASED ON WIRELESS SMART SENSOR NETWORKS AND ENERGY HARVESTING TECHNIQUES

Jong Woong Park, Soojin Cho, Hyung-Jo Jung, Chung-Bang Yun, Shin Ae Jang, Hongki Jo, Billie F. Spencer, Jr, Tomonori Nagayama, Ju-Won Seo

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**B-2: (OS) Verification of Structural Control by Observation Records 2**

14:10-15:50 Sagami (42F)

*Co-Chair:* Y. Ikeda, *Co-Chair:* I. Nagashima

**061** BASE ISOLATED SUPER HIGH-RISE RC BUILDING COMPOSED OF THREE CONNECTED TOWERS WITH VIBRATION CONTROL SYSTEMS

A. Nishimura, I. Ishide, M. Yamamoto, H. Hamaguchi, T. Sone, A. Kushibe

**062** PERFORMANCE OF A SEISMIC ISOLATED BUILDING UNDER STRONG EARTHQUAKES

T. Komuro, S. Kawamoto, M. Tamari, H. Fukuyama, M. Iiba

**063** APPLICATION OF ACTIVE BASE ISOLATION SYSTEM USING ABSOLUTE VIBRATION CONTROL TECHNOLOGY

O. Yoshida, M. Kageyama, T. Sano, F. Endo, T. Watanabe, H. Katsumata, M. Yamanaka

**064** STUDY FOR COUNTERMEASURE OF STAY CABLE VIBRATION USING HYDRAULIC DAMPER

S. Yamazaki, Y. Fujino, L.M. Sun, N. Hoang, Di Su

**065** DEVELOPMENT OF A CABLE EXCITING ROBOT TO EVALUATE DAMPING RATIOS OF A STAY CABLE

Jong-Jae Lee, Jae-Min Kim, Sang-Sup Ahn, Jun-Seong Choi

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**C-2: (OS) Seismic Safety of Bridges with Response Control Technologies**

14:10-15:50 Tsukui (42F)

*Co-Chair:* H. Iemura, *Co-Chair:* S. Nagarajaiah

**106** THE EIGENMODES OF SEISMIC ISOLATED BRIDGES

G. Kampas, N. Makris

**107** THE USE OF HERMETIC FLUID VISCOUS DAMPERS TO SUPPRESS BROAD BANDWIDTH VIBRATIONS ON BRIDGES

Douglas P. Taylor

**108** DAMAGE MECHANISM AND DAMAGE CONTROL OF LONG SPAN CABLE-STAYED BRIDGES UNDER STRONG EARTHQUAKE

Limin Sun, Wen Xie

**109** SEISMIC RETROFIT OF THE CABLE-STAYED 640M SPAN TEMPOZAN BRIDGE WITH ENERGY ABSORBING DEVICES

Koichi Sugioka, Hiroshi Kobayashi, Nobuhiro Mashima



- 110 SEISMIC RETROFIT OF THE ALL-FREE TYPE CABLE-STAYED HIGASHI-KOBE BRIDGE WITH NEW ENERGY DISSIPATION DEVICES  
M. Nagasawa, K. Sumi, K. Tasaki, H. Iemura

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## D-2: Damage Evaluation 2

14:10-15:50 Mitake (42F)

*Co-Chair: J. Kim, Co-Chair: W. Lin*

- 151 DAMAGE EVALUATIONS FOR A 3-STORY RC STRUCTURE USING TRAINED PERCEPTION  
Ji Young Kim, Ju yeon Kim, Dae Young Kim
- 152 DAMAGE DETECTION IN A STRUCTURE BASED ON SHAKING TEST  
M. Kawashima, T. Suzuki, Y. Hirata
- 153 FIELD MEASUREMENT DATA AND A REDUCED-ORDER FINITE ELEMENT MODEL FOR TASK I OF THE SHM BENCHMARK PROBLEM FOR HIGH-RISE STRUCTURES  
W. Lin, Y. Q. Ni, Y. Xia, W. H. Chen
- 154 PIEZO-ACTIVATED ULTRASONIC WAVES FOR DAMAGE DETECTION IN REBAR-REINFORCED CONCRETE BEAMS  
Ye Lu, Lin Ye, Jianchun Li, Dong Wang

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## E-2: System Identification of Civil Engineering Structures

14:10-15:50 Musashi (42F)

*Co-Chair: S. Chao, Co-Chair: M. Abe*

- 196 SHM-BASED LIFE-CYCLE CONDITION ASSESSMENT OF SUSPENDERS IN CABLE SUSPENSION BRIDGE  
S.L. Li, S. Zhu, Y.L. Xu, Z.W. Chen, H. Li
- 197 BOUNDARY CONDITION IDENTIFICATION OF A REAL-LIFE BRIDGE BY USE OF ADDITIONAL KNOWN MASSES  
H.M. Dinh, T. Nagayama, Y. Fujino, N. Sakurai, H. Nakayama
- 198 OUTPUT ONLY DYNAMIC SYSTEM IDENTIFICATION USING BLIND SOURCE SEPARATION TECHNIQUE  
Shu-Hsien Chao, Chin-Hsiung Loh
- 199 RESPONSE VARIABILITY AMONG IDENTICAL EXPRESSWAY BRIDGES UNDER MOVING VEHICLES  
C.H. Tandian, Y. Fujino, T. Nagayama, D.M. Siringoringo, D. Su
- 200 BRIDGE PIER SCOUR MONITORING USING TILTMETER AND ACCELEROMETER  
M. Abe, K. Sugisaki, A. Horiai, M. Abe, M. Shimamura

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## **F-2: Seismic Retrofit**

14:10-15:50 Tama (42F)

*Co-Chair: M. A.N. Abdel-Mooty, Co-Chair: A. Joghataie*

- 241 SEISMIC RETROFIT OF HIGH-RISE BUILDING WITH DEFORMATION-DEPENDENT OIL DAMPERS  
C. Yoshimura, H. Aono, Y. Kimura, O. Hosozawa
- 242 SEISMIC ENERGY DISSIPATION IN RC BUILDINGS THROUGH BOTH STRUCTURAL DAMAGE AND ADDED DAMPERS  
M. Abdel-Mooty, H. Hasan, A. Al-Hassan
- 243 SHAKING TABLE TESTS ON HALF-SCALE BRICK WALLS REINFORCED BY CU-AL-MN SMA RODS SUBJECTED TO OUT-OF-PLANE FLEXURE  
K.C. Shrestha, I. Ibarada, T. Nagae, T. Omori, Y. Sutou, Y. Araki
- 244 A DISPLACEMENT-BASED DESIGN PROCEDURE OF SMA RESTRAINERS FOR UNSEATING MITIGATION OF HIGHWAY BRIDGES  
A.X. Guo, L.L. Cui, H. Li
- 245 CONFINED MASONRY WALLS SEISMIC RESPONSE MITIGATION USING TMDS  
A. Joghataie, M. Mohebbi

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**Coffee Break**

15:50-16:20 Takao (42F)

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## **A-3: (OS) Structural Monitoring and Vibration Control at E-Defense**

16:20-18:00 Fuji (42F)

*Co-Chair: T. Okazaki, Co-Chair: O. Furuya*

- 021 STRUCTURAL DAMAGE EVALUATION OF HIGH-RISE BUILDINGS SUBJECTED TO LONG-PERIOD EARTHQUAKE SHAKING BY USE OF STRONG MOTION ACCELEROGRAPHS AND FIBER OPTIC SENSORS  
J. Tobita, N. Fukuwa, Y. Hirata
- 022 VIBRATION-BASED DAMAGE DETECTION OF A HIGH-RISE STEEL BUILDING BEFORE AND AFTER THE E-DEFENSE SHAKING TABLE TEST  
Kenji. Kanazawa, Haruyuki. Kiramura, Daiki.Sato, Masashi Morimoto, Masaru Ono, Takuya Nagae
- 023 DEVELOPMENT OF SHAKING TABLE TEST TECHNIQUES TO REALIZE LARGE RESPONSES AND TO CONTROL THE REPRODUCED RESPONSE  
Ryuta Enokida, Xiaodong Ji, Kouichi Kajiwara, Takuya Nagae, Masayoshi Nakashima
- 024 THREE-DIMENSIONAL DISPLACEMENT MEASUREMENT OF VIBRATION TESTING OF REAL SIZE BRIDGE MODELS  
Yasushi Niitsu, Osamu Furuya, Tadashi Mikoshiba, Koichi Kajiwara, Ohmichi Ukon
- 025 MEASURING TECHNIQUE FOR THREE DIMENSIONAL DYNAMIC DISPLACEMENT IN FULL-SCALE TESTING USING IMAGE PROCESSING  
O. Furuya, Y. Niitsu, S. Fujita

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### **B-3: (OS) Advances in System Identification and SHM**

16:20-18:00 Sagami (42F)

*Co-Chair:* L. Faravelli, *Co-Chair:* J. Rodellar

**066** *Session Keynote*

HYSTERESIS MODELING AND IDENTIFICATION OF DEVICES FOR STRUCTURAL CONTROL  
J. Rodellar, N. Luo, F. Casciati

**067** DATA-DRIVEN MULTIACTUATOR PIEZOELECTRIC SYSTEM FOR STRUCTURAL DAMAGE LOCALIZATION

L.E. Mujica, D.A. Tibaduiza, J. Rodellar

**068** SUBSPACE IDENTIFICATION OF THE GUANGZHOU NEW TV TOWER

L. Faravelli, F. Ubertini, C. Fuggini

**069** ROBUST CONTROL ALGORITHM FOR ACTIVE MASS DAMPERS WITH SYSTEM CONSTRAINTS

F. Ubertini, M. Breccolotti

**070** ROBUST VIBRATION CONTROL FOR STRUCTURES WITH WIRELESS SENSORS

Ningsu Luo, Hamid Reza Karimi, Mauricio Zapateiro

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### **C-3: (OS) Large-Scale and Decentralized Structural Control**

16:20-18:00 Tsukui (42F)

*Co-Chair:* Y. Wang, *Co-Chair:* R. Christenson

**111** DECENTRALIZED CONTROL OF STRUCTURAL SYSTEMS USING A NORM UPPER BOUND FORMULATION

Javad Mohammadpour, Kazuhiko Hiramoto, Karolos Grigoriadis

**112** SEMI-DECENTRALIZED OUTPUT FEEDBACK  $H_\infty$  CONTROL STRATEGY FOR LARGE BUILDING STRUCTURES

Josep M. Rossell, Francisco Palacios-Quiñonero, José Rodellar

**113** DECENTRALIZED  $H_2$  CONTROL FOR CIVIL STRUCTURES THROUGH HOMOTOPIC TRANSFORMATION

Yang Wang, Kincho H. Law, Chin-Hsiung Loh

**114** FABRICATION AND EXPERIMENT OF A SEMI-ACTIVE RESETTABLE ENERGY DISSIPATING DEVICE USING MR-FLUID

Seyed Masoud Sajjadi Alehashem, Yi Qing Ni, Ali Keyhani

**115** OPTIMAL DESIGN OF MULTIPLE-TMDS FOR STRUCTURES SUBJECTED TO SEISMIC EXCITATION BY GENETIC ALGORITHMS

M. Mohebbi, Y. Ghanbarpour

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### **D-3: (OS) Monitoring of Wind-Induced Responses of Buildings and Structures and Modal Identification**

16:20-18:00 Mitake (42F)

*Co-Chair: Y. Xu, Co-Chair: Y. Tamura*

- 156** MONITORING THE HORIZONTAL DISPLACEMENT OF SLIM HIGH TOWERS CAUSED BY DAILY TEMPERATURE VARIATION AND WIND IMPACT BY APPLICATION OF STATIC AND KINEMATIC GPS-MODE - SOME RESULTS -  
Peter Breuer
- 157** APPLICATION OF GPS FOR MONITORING LONG-SPAN CABLE-SUPPORTED BRIDGES UNDER HIGH WINDS  
Y.L. Xu, W.S. Chan, X.L. Ding
- 158** RESPONSE MONITORING AND MODAL IDENTIFICATION OF LONG-SPAN ROOF STRUCTURES  
A. Yoshida, Y. Tamura, C.J. Ku, J.Y. Kim, K. Miyake
- 159** SMARTSYNC: AN INTEGRATED REAL-TIME MONITORING AND SYSTEM IDENTIFICATION PLATFORM FOR TALL BUILDINGS  
D.K. Kwon, T. Kijewski-Correa, A. Kareem
- 160** FUNDAMENTAL BENDING MODE AND VIBRATION MONITORING WITH INCLINOMETER AND ACCELEROMETER ON HIGH-RISE BUILDINGS SUBJECT TO WIND LOADS  
X. Li, C. Rizos, Y. Tamura, L. Ge, A. Yoshida, J. Cranenbroeck

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### **E-3: Detection, Recognition and Identification**

16:20-18:00 Musashi (42F)

*Co-Chair: M. Huang, Co-Chair: K. Nakazawa*

- 201** LEAKY COAXIAL CABLE USAGE FOR MONITORING REAL-TIME HEAVY RAIN  
T. Mizutani, Y. Fujino, K. Inomata, W. Tsujita, T. Nagayama, T. Nishikawa, M. Shikai, K. Sumi
- 202** SYSTEM IDENTIFICATION OF A BUILDING WITH CONSIDERING OF SOIL-FOUNDATION-STRUCTURE INTERACTION  
Ming-Chih Huang, Tzu-Kang Lin, Jer-Fu Wang, Chern-Hwa Chen
- 203** BEHAVIOUR PATTERN RECOGNITION OF A SOLITUDE SENIOR BY THE STRATIFIED ACTION MODEL BASED ON HIDDEN MARKOV MODEL  
T. Takiguchi, K. Nakazawa
- 204** THREE-DIMENSIONAL DATA CONSTRUCTION METHOD OF OBJECTS USING STEREO VISION ATTACHED ON AUTONOMOUS MOBILE ROBOT  
K. Nakazawa, H. Kambayashi
- 205** ACTIVITY RECOGNITION FOR BIOFICATION OF LIVING SPACES USING ROBOT  
Chua Pei Shan, A. Mita

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**F-3: Passive Vibration Control**

16:20-18:00 Tama (42F)

*Co-Chair: M. Iiba, Co-Chair: T. Tomizawa*

- 246 VIBRATION CONTROL OF OFFSHORE JACKET PLATFORMS WITH HYBRID DAMPING SYSTEMS  
M. Kashani, A.A. Golafshani, A. Gholizad
- 247 SEISMIC ASSESSMENT OF CONCENTRICALLY BRACED FRAMES EQUIPPED WITH AN INNOVATIVE BUCKLING PREVENTING HYDRAULIC DAMPER  
M.J. Hamidia, A. Hosseini
- 248 EFFECTS OF PASSIVELY VARIABLE OIL DAMPER ON RESPONSE REDUCTION OF SEISMICALLY ISOLATED HOUSES UNDER HIGH VELOCITY EARTHQUAKE MOTION  
M. Iiba, T. Hanai, T. Shizume, T. Minagawa
- 249 VIBRATION SERVICEABILITY ASSESSMENT AND PASSIVE VIBRATION CONTROL OF A LIVELY FOOTBRIDGE  
C.M. Casado, J. de Sebastián, I.M. Díaz, A. Poncela
- 250 EVALUATION OF THE VIBRATION CONTROL PERFORMANCE BASED ON STRUCTURAL MONITORING FOR ACTUAL BUILDINGS WITH BRACE-TYPE OIL DAMPER  
T. Tomizawa, O. Takahashi, Y. Okano

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**Reception**

18:10-20:00 Eminence Hall (5F)

# **Technical Program**

Tuesday, July 13

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## **Keynote 4&5**

8:30-9:30 Ohgi (4F)

- K-4** PRACTICAL EXAMPLES OF SEISMIC ISOLATION AND RESPONSE CONTROL BUILDINGS AND APPLICATION OF MONITORING SYSTEMS  
T. Kobori
- K-5** RECENT DEVELOPMENT AND APPLICATION ON SEISMIC ISOLATION, ENERGY DISSIPATION AND STRUCTURAL CONTROL IN CHINA  
Fu Lin Zhou, Ping Tan, Wen Heisha, Xiangyun Huang

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## **Coffee Break**

9:30-10:00 Takao (42F)

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## **A-4: (OS) Bio-inspired Sensing and Bio-inspired Actuation**

10:00-11:40 Fuji (42F)

*Co-Chair:* J. Lynch, *Co-Chair:* K. J. Loh

- 026** PASSIVE WIRELESS SENSOR SKIN FOR CRACK DETECTION AND MONITORING  
X. Xu, S. Deshmukh, I. Mohammad, H. Huang\*
- 027** OPTIMIZING GENERATION OF MOBILE MONITORING AGENTS IN ARTIFICIAL-IMMUNE-SYSTEM-BASED MONITORING NETWORKS  
B. Chen, W. Liu
- 028** TUNING THE MECHANICAL PERFORMANCE OF CARBON NANOTUBE SENSING SKINS VIA POST-FILM FABRICATION THERMAL ANNEALING  
Y. Zhao, K.J. Loh\*
- 029** STRUCTURAL DAMAGE DETECTION THROUGH CROSS CORRELATION ANALYSIS OF MOBILE SENSING DATA  
Dapeng Zhu, Xiaohua Yi, Yang Wang, Karim Sabra
- 030** MDOF VIBRATION CONTROL SYSTEM DESIGN USING PSO WITH MUTATION RULE  
H. Yoshioka, H. Matsushita, Y. Takahashi

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## **B-4: (OS) Advanced Structural Health Monitoring for Buildings 1**

10:00-11:40 Sagami (42F)

*Co-Chair:* S. Masri, *Co-Chair:* I. Nishimura

- 071** DEVELOPMENT OF USER-FRIENDLY APPLICATION SOFTWARE FOR STRUCTURAL HEALTH MONITORING  
H. Zheng, K. Megawati, I. Yokoi

- 072 APPLICATION OF PRACTICAL PLATFORM OF STRUCTURAL HEALTH MONITORING SYSTEM TO REAL BUILDINGS  
H. Sato, A. Mita
- 073 STRUCTURAL IDENTIFICATION BASED ON MICRO-TREMOR MEASUREMENT AND MULTI-FRAME MODEL ANALYSES OF TRADITIONAL JAPANESE WOODEN PAGODA  
Y. Mukai, E. Tanaka, M. Matsuo
- 074 DYNAMIC PERFORMANCE ESTIMATION OF TALL BUILDINGS BASED ON AMBIENT VIBRATION AND OUTPUT ONLY IDENTIFICATION  
K. Ichimura, A. Mita
- 075 MODAL ANALYSIS OF STAY CABLES WITH DAMPED CROSS-TIES COUNTERMEASURE  
Yagang Zhou, Limin Sun, Zheng Zhong

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#### **C-4: (OS) Semiactive Control of Structures 1**

10:00-11:40 Tsukui (42F)

*Co-Chair: S. Narasimhan, Co-Chair: S. Dyke*

- 116 ACCOMMODATING MR DAMPER DYNAMICS FOR CONTROL OF LARGE SCALE STRUCTURAL SYSTEMS  
A. Friedman, B. Phillips, Z. Jiang, S.J. Dyke, B.F. Spencer, R.E. Christenson, J. Zhang, Y. Cha, A. Agrawal, J. Ricles, R. Sause
- 117 PERFORMANCE EVALUATION OF SELF-POWERED SMART DAMPING SYSTEM BASED ON MR DAMPER USING HYBRID SIMULATION  
D.D. Jang, J.S. Park, S.H. Sung, H.J. Jung
- 118 A NOVEL POLYNOMIAL CONTROL ALGORITHM FOR THE SEISMICALLY EXCITED HIGHWAY BRIDGE BENCHMARK  
Y.-J. Cha, A.K. Agrawal
- 119 EXPERIMENTAL STUDIES ON AN ADAPTIVE PENDULUM MASS DAMPER  
A.J. Roffel, R. Lourenco, S. Narasimhan
- 120 OPTIMAL PSEUDO-NEGATIVE STIFFNESS CONTROL CONCEPT FOR SEISMIC RESPONSE CONTROL OF STRUCTURES USING SEMI-ACTIVE DAMPERS  
A. Igarashi, M. Higuchi

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#### **D-4: (OS) Application of System Identification for Real Structures 1**

10:00-11:40 Mitake (42F)

*Co-Chair: Q. Xie, Co-Chair: H. Tang*

- 161 APPLICATION OF PARTICLE SWARM OPTIMIZATION ALGORITHMS FOR STRUCTURAL DAMAGE IDENTIFICATION  
H. Tang, S. Xue, S. Takahashi, F. Li
- 162 APPLICATION OF DIFFERENTIAL EVOLUTION FOR STRUCTURAL SYSTEM IDENTIFICATION  
J. Chen, L.Y. Xie, H.S. Tang, J. Zhou

- 163 ESTIMATING RESTORING FORCE OF A BASE-ISOLATED HOSPITAL BUILDING BY COMPONENT SYNTHESIS METHOD  
L.Y. Xie, A. Mita, T. Kato, C.F. Wan
- 164 COMPARISON OF THE VIBRATION CHARACTERISTICS OF THE LOW-RISE RC BUILDING BEFORE AND AFTER SEISMIC RETROFIT  
K. Mitsuji, M. Motosaka, Y. Takahashi, K. Tsukamoto, A. Shibayama
- 165 LINEAR MODEL ESTIMATE-BASED OPTIMAL SENSOR LOCATION ALGORITHM FOR BUILDING STRUCTURAL HEALTH MONITORING  
Q. Xie, R. Zhu, S. Xue

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#### **E-4: Assessment**

10:00-11:40 Musashi (42F)

*Co-Chair: S. Li, Co-Chair: Q. Wang*

- 206 SEISMIC FRAGILITY ANALYSIS OF SMART STRUCTURES  
Yeesock Kim, Jong-Wha Bai
- 207 AN ANALYTICAL METHOD FOR IDENTIFYING NORMAL FORCE AND BOUNDARY CONDITION OF AN TWO-DIMENSIONAL EULER BEAM  
Suzhen Li, Guido De Roeck
- 208 ASSESSMENT CYCLIC BEHAVIOR AND DETERMINE THE RBS CONNECTION FLEXIBILITY  
J. Kiani
- 209 EXPERIMENTAL VERIFICATION OF CONTROLLED SUBSTRUCTURE IDENTIFICATION FOR SHEAR STRUCTURES  
D. Zhang, C. DeVore, E.A. Johnson

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#### **F-4: Modeling and Optimization**

10:00-11:40 Tama (42F)

*Co-Chair: J. Pei, Co-Chair: K. Yamamoto*

- 251 CRITICAL EARTHQUAKE LOADS FOR PASSIVELY CONTROLLED INELASTIC BUILDING STRUCTURES CONSIDERING EVOLUTION OF SEISMIC WAVES  
K. Ueno, A. Moustafa, I. Takewaki
- 252 AMD SUBSYSTEM TESTING METHOD AND ITS APPLICATION IN AMD PERFORMANCE TEST  
Huaibing Xu, Jinping Ou, Hui Li, Chunwei Zhang
- 253 A CONSTRUCTIVE METHOD FOR MULTILAYER FEEDFORWARD NEURAL NETWORK INITIALIZATION TO APPROXIMATE NONLINEAR RESTORING FORCES  
Jin-Song Pei, Eric C. Mai, Joseph P. Wright, Sami F. Masri
- 254 ADAPTIVE SENSITIVITIES OF OPTIMAL DAMPER PLACEMENT FOR VARIABLE STIFFNESS DISTRIBUTIONS OF BUILDING FRAME  
K. Fujita, I. Takewaki



255  $H_{\infty}$  OPTIMIZATION IN DAMPER PLACEMENT FOR INTERSTORY DRIFT AND ACCELERATION CONTROL OF BUILDING STRUCTURES

K. Yamamoto, K. Fujita, I. Takewaki

Lunch 11:40-13:00 Moon Light, Orion, Commet, Subaru, Star Light (43F)

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**Keynote 6**

13:00-13:30 Ohgi (4F)

K-6 RECENT ADVANCES IN BIO-SENSING AND BIO-ACTUATION CONCEPTS

A. Flatau

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**A-5: (OS) Time Frequency Methods in Structural Health Monitoring**

13:30-15:10 Fuji (42F)

*Co-Chair: S. Nagarajaiah, Co-Chair: B. Basu*

031 **Session Keynote**

VIBRATION ANALYSIS OF SIMULATED MDOF TIME-VARIANT SYSTEMS USING THE HILBERT-HUANG TRANSFORM

T.S. Gallego, W.J. Staszewski, K. Worden

032 IDENTIFICATION OF MODAL PARAMETERS OF LINEAR SYSTEMS USING WAVELET BASED TIME-FREQUENCY ANALYSIS: AN EXPERIMENTAL INVESTIGATION

A. Chakraborty, B. Basu, S. Nagarajaiah

033 TIME-FREQUENCY AND WAVELET BASED APPROACHES FOR OUTPUT ONLY MODAL IDENTIFICATION AND DAMAGE DETECTION IN STRUCTURES

S. Nagarajaiah, B. Basu

034 DETECTION OF BRIDGE DYNAMIC PARAMETERS USING AN INSTRUMENTED VEHICLE

A. González, E. O'Brien, P. McGetrick

035 DAMAGE DETECTION OF STRUCTURES USING DISCRETE WAVELET TRANSFORM

Nikos G. Pnevmatikos

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**B-5: (OS) Advanced Structural Health Monitoring for Buildings 2**

13:30-15:10 Sagami (42F)

*Co-Chair: C. Kondo, Co-Chair: Y. Suzuki*

076 USING RECORDED EARTHQUAKE-RESPONSE DATA TO ESTIMATE BASE SHEAR VERSUS ROOF DRIFT CURVES IN BUILDINGS

A. Irfanoglu, B. N. Luna

077 DAMAGE DETECTION OF ACTUAL BUILDING STRUCTURES THROUGH SINGULAR VALUE DECOMPOSITION OF POWER SPECTRAL DENSITY MATRICES OF MICROTREMOR RESPONSES

Y. Suzuki, Y. Ikeda, Y. Suzuki, N. Adachi, T. Nozawa

**078** MEASUREMENT OF ACTUAL BUILDING MOTIONS ON FORCED VIBRATION TEST BY NONCONTACT-TYPE RELATIVE STORY DISPLACEMENT SENSORS

Tomohiko Hatada, Motoichi Takahashi, Ryuta Katamura, Yasutsugu Suzuki, Iwao Matsuya, Kiyoshi Kanekawa, Yoshihiro Nitta, Akira Nishitani

**079** OPTIMAL SENSOR PLACEMENT FOR STRUCTURAL HEALTH MONITORING OF DALIAN NEW GYMNASIUM

D.S. LI, L. Ren, H.N. LI, Z.G. Jia

**080** STRUCTURAL HEALTH MONITORING OF RETROFITTED STRUCTURES IN IRAN

Mehdi Mohammadpour Lima

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**C-5: (OS) Semiactive Control of Structures 2**

13:30-15:10 Tsukui (42F)

*Co-Chair: S. Dyke, Co-Chair: S. Narasimhan*

**121** TOWARD RELIABILITY-BASED DESIGN OF SMART PATTERN IDENTIFIERS FOR SEMI-ACTIVE CONTROL APPLICATIONS

M. Hassan

**122** SEMI-ACTIVE CONTROL FOR ISOLATED STRUCTURE USING VARIABLE DAMPING DEVICE BASED ON RESPONSE EVALUATOR OF BUILDING RESPONSE

A. Fukukita, M. Takahashi

**123** SEMI-ACTIVE PREDICTIVE CONTROL FOR SEISMICALLY EXCITED STRUCTURES USING MRF-04K DAMPERS

Long-He Xu, Zhong-Xian Li

**124** VERIFICATION OF ACCURACY OF REAL-TIME HYBRID TEST AND EFFICACY OF SEMI-ACTIVE CONTROL

A. Ito, R. Kawasaki, H. Fujitani, N. Inoue

**125** DEVELOPMENT OF A NOVEL SEMI-ACTIVE TUNED MASS DAMPER FOR VIBRATION CONTROL OF STRUCTURES

A.K. Ghorbani-Tanha

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**D-5: (OS) Application of System Identification for Real Structures 2**

13:30-15:10 Mitake (42F)

*Co-Chair: H. Tang, Co-Chair: Q. Xie*

**166** STRUCTURAL HEALTH MONITORING ON HONSHU-SHIKOKU BRIDGES

S. Fukunaga, S. Kusuhara

**167** STRUCTURAL HEALTH MONITORING OF STEEL TRUSS BRIDGES BASED ON MODAL DAMPING CHANGES IN LOCAL AND GLOBAL MODES

T. Yoshioka, H. Yamaguchi, Y. Matsumoto

**168** IDENTIFICATION OF CABLE DAMPING CHARACTERISTICS OF A LONG-SPAN CABLE-STAYED BRIDGE

D. Su, Y. Fujino, T. Nagayama, S. Yamazaki

- 169 AUTOMATIC SYSTEM IDENTIFICATION TECHNIQUES FOR STRUCTURAL HEALTH MONITORING APPLICATIONS  
R. O'Connell, D.T. Lau
- 170 RESEARCH ON THE STRUCTURAL HEALTH MONITORING SYSTEM OF STEEL PIPE-ENCASED CONCRETE BRIDGE  
Liu Xiangqian, Zhou Jing, Ren Liang, Zhu Tong

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### E-5: Sensor System

13:30-15:10 Musashi (42F)

*Co-Chair:* T. Uhl, *Co-Chair:* M. Nishio

- 211 ULTRASONIC GUIDED WAVES BASED METHOD FOR SHM - SIMULATIONS AND AN EXPERIMENTAL TEST  
L. Ambrozinski, P. Packo, T. Stepinski, T. Uhl
- 212 EXPERIMENTAL CHARACTERIZATION OF WIRELESS COMMUNICATION PERFORMANCE FOR NETWORK IMPLEMENTATION  
L. E. Linderman, J.A. Rice, S. Barot, B.F. Spencer, Jr., J.T. Bernhard, S. Jang
- 213 MEASUREMENT USING OPTICAL FIBER SENSORS IN ORDER TO ENSURE AND KEEP TRACK OF THE QUALITY AND PERFORMANCE OF BUILDINGS FROM THE DESIGN TO POST-COMPLETION STAGES  
T. Nishizawa, T. Ohno, J. Tobita, N. Fukuwa
- 214 STRUCTURAL SHAPE RECONSTRUCTION WITH CONSIDERATION OF BOUNDARY CONDITION CHANGES USING DISTRIBUTED STRAIN DATA FROM PPP-BOTDA SYSTEM  
M. Nishio, N. Takeda
- 215 SENSOR FAULT DIAGNOSIS OF SMART BUILDINGS  
Yeesock Kim, Reza Sharifi, Young-Jin Cha, Reza Langari

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### F-5: Control Application 1

13:30-15:10 Tama (42F)

*Co-Chair:* P. Reynolds, *Co-Chair:* M. Kohiyama

- 256 ANALYTICAL AND EXPERIMENTAL EVALUATION OF ACTIVE VIBRATION CONTROL OF AN OFFICE FLOOR STRUCTURE  
M. J. Hudson, P. Reynolds
- 257 AN ACTIVE SEISMIC ISOLATION SYSTEM CONTROLLED BY A SLIDING MODE CONTROLLER  
M. Yamamoto, T. Sone, H. Yoneda
- 258 GAIN SCHEDULING CONTROL OF A VARIABLE ORIFICE DAMPER APPLIED TO A THREE STORY BUILDING SUBJECTED TO EARTHQUAKE EXCITATION  
G. Kinay, G. Turan, E. Aydın
- 259 FREQUENCY SHAPING AND VARIABLE GAIN FEEDBACK TO CONTROL SEISMIC RESPONSE OF A BUILDING AND ELEVATOR ROPE  
M. Kohiyama, T. Baba

- 260 EVALUATION OF SEMI-ACTIVE CONTROL USING HARMONICALLY VARYING DAMPING BY REAL-TIME HYBRID SIMULATION  
D. Iba, B.M. Phillips, B.F. Spencer, Jr.

Coffee Break

15:10-15:40 Takao (42F)

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## A-6: (OS) Vibration-Based Energy Harvesting

15:40-17:20 Fuji (42F)

*Co-Chair: J. Scruggs, Co-Chair: H. Jung*

- 036 DEVELOPMENT OF 2DOF ENERGY HARVESTER  
S.-J. Jang, Y.P. Lee, D.D. Jang, H.J. Jung
- 037 ENERGY HARVESTING WITH THE RESONATOR ARRAY BY AIR FLOW IN A DUCT  
Sanghwan Kim, Jaeyun Lee, Kwangsoo Kim, Jongdae Kim, Bumkyoo Choi
- 038 DESIGN AND EXPERIMENTAL CHARACTERIZATION OF A THREE-PHASE, 1KN REGENERATIVE ACTUATOR  
J.T. Scruggs, I.L. Cassidy, S. Behrens
- 039 A STUDY ON THE CHARACTERISTICS OF PIEZOELECTRIC ENERGY CONVERSION SYSTEM  
Jaeyun Lee, Jaegeun Oh, Bumkyoo Choi
- 040 STUDY OF ENERGY HARVESTING TECHNOLOGY IN STRUCTURAL HEALTH MONITORING  
T.H. Lin, S.L. Hung, Y. Fujino, T. Nagayama

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## B-6: (OS) Data Informatics for SHM

15:40-17:20 Sagami (42F)

*Co-Chair: T. Hamamoto, Co-Chair: C. Chang*

- 081 SHAKING TABLE TEST ON INDIRECT HEALTH MONITORING OF PILE FOUNDATIONS  
J. Choi, T. Hamamoto
- 082 DEVELOPMENT OF AN ADAPTIVE WIRELESS SENSOR PLATFORM FOR STRUCTURAL HEALTH MONITORING  
Der-Cherng Liaw, Yi-Hung Hsieh, Tsung-Yi Lu, Shih-Lin Hung, Shih-Lin Hung
- 083 IDENTIFICATION OF TIME-VARYING STRUCTURES USING INCOMPLETE AND FUSED MEASUREMENT  
Y. Shi, C.C. Chang
- 084 DECENTRALIZED STRUCTURAL PARAMETER IDENTIFICATION USING KALMAN FILTER ALGORITHM  
M. Shiraishi, A. Mita
- 085 STUDY OF A CLUSTER-BASED APPLICATION LAYER NETWORKING SYSTEM ON ZIGBEE SENSOR NETWORKS  
Chau-Chung Song, Chen-Fu Feng, Yin-Chieh Hsu, Yu-Kai Chen

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## C-6: (OS) Advances in Structural Control

15:40-17:20 Tsukui (42F)

*Co-Chair: N. Luo, Co-Chair: J. Gerstmayr*

- 126 FORCE-DERIVATIVE FEEDBACK SEMI-ACTIVE CONTROL OF BASE-ISOLATED BUILDINGS USING LARGE-SCALE MR FLUID DAMPERS  
A. Rodríguez, A. Bahar, F. Pozo, L. Acho, Y. Vidal, J. Rodellar
- 127 ACTIVE CONTROL OF HYSTERETIC BASE-ISOLATED STRUCTURES VIA DELAYED SIGNALS  
L. Acho, N. Luo, Y. Vidal, F. Pozo
- 128 FAULT-TOLERANT VIBRATION CONTROL OF FLEXIBLE STRUCTURES  
M. Zapateiro, N. Luo, H.R. Karimi
- 129 STRUCTURAL CONTROL OF MULTI-STOREY FRAME STRUCTURES WITH PIEZOELECTRIC SENSOR / SELF-SENSING ACTUATOR NETWORKS  
M. Zellhofer, M. Krommer, Y. Vetyukov, G. Zenz
- 130 CONTROL OF VIBRATIONS OF MOVING STRUCTURES BY ACTIVE TENDONS  
Johannes Gerstmayr, Michael Stangl, Manfred Nader, Karin Nachbagauer

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## D-6: (OS) Structural Health Monitoring of Highway Bridges

15:40-17:20 Mitake (42F)

*Co-Chair: M. W. Halling, Co-Chair: Z. Wu*

- 171 LONG-TERM MONITORING OF A SINGLE SPAN PRESTRESSED CONCRETE GIRDER BRIDGE  
Steven Petroff, Timothy Thurgood, Marvin Halling, Paul Barr
- 172 PRELIMINARY STUDY OF A WIRELESS STRUCTURAL MONITORING SYSTEM FOR THE NEW CARQUINEZ SUSPENSION BRIDGE  
M. Kurata, J.P. Lynch, G.W. van der Linden, V. Jacob, P. Hipley
- 173 MONITORING OF DYNAMIC CHARACTERISTICS OF STEEL-BOX BRIDGE SYSTEM USING CUMS  
G.H. Heo, J.R. Jeon, D.J. Sohn, J.W. Oh
- 174 HEALTH DIAGNOSIS OF A HIGHWAY CABLE-STAYED BRIDGE USING IDENTIFIED MODAL PARAMETERS WITH MULTI-OPERATIONAL GRADES  
Yang Liu, Shunlong Li, Hui Li
- 175 STRUCTURAL PERFORMANCE ASSESSMENT OF HONGXIN BRIDGE BASED ON DISTRIBUTED LONG-GAGE FBG SENSORS  
W. Hong, C.Q. Yang, C.F. Wan, Y.F. Zhang, Z.S. Wu

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## E-6: Sensing Technology

15:40-17:20 Musashi (42F)

*Co-Chair:* T. L. Kijewski-Correa, *Co-Chair:* J. Kim

- 216 AN EXPERIMENTAL STUDY ON RELATIVE DISPLACEMENT DIRECT SENSING IN REAL-TIME USING PHOTOTRANSISTOR ARRAY FOR BUILDING STRUCTURES  
Kiyoshi Kanekawa, Iwao Matsuya, Maya Sato, Yoshihiro Nitta, Takashi Tanii, Akira Nishitani, Shuichi Shoji, Iwao Ohdomari, Tomohiko Hatada, Motoichi Takahashi
- 217 A RAPIDLY RE-DEPLOYABLE WIRELESS SENSOR NETWORK FOR STRUCTURAL ASSESSMENT BY NON-EXPERT END USERS: THE CITI-SENSE CONCEPT  
T. Kijewski-Correa, L. Montestruque, S. Su, G. Savona
- 218 NONLINEAR PIEZOELECTRIC IMPEDANCE MODULATION METHOD FOR DETECTION OF CONTACT-TYPE DAMAGES  
A. Masuda, J. Aoki, D. Iba, A. Sone
- 219 SMART SENSOR-BASED MONITORING AND SYSTEM IDENTIFICATION FOR STRUCTURAL HEALTH ASSESSMENT OF PSC GIRDER BRIDGES  
Jeong-Tae Kim, Jae-Hyung Park, Dong-Soo Hong, Duc-Duy Ho
- 220 USE OF IMOTE2 WITH SHM-A WIRELESS SMART SENSOR NODES  
N. de Battista, J.M.W. Brownjohn

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## F-6: Control Application 2

15:40-17:20 Tama (42F)

*Co-Chair:* N. Nakata, *Co-Chair:* A. Ramaswamy

- 261 ACCELERATION TRAJECTORY TRACKING CONTROL FOR SHAKE TABLES  
N. Nakata
- 262 INTELLIGENT HYBRID CONTROL FOR LONGITUDINAL VIBRATION RESPONSES OF TIAN XINGZHOU CABLE-STAYED BRIDGE  
Wei-lian Qu, Shun-Quan Qin, Jian-Wei Tu, Jia Liu, Qiang Zhou, Yong-Lin Pi
- 263 COMPARATIVE PERFORMANCE OF NONLINEAR AND INTELLIGENT CONTROL ALGORITHMS  
Sk. Faruque Ali, Ananth Ramaswamy
- 264 MAXIMUM BHATTACHARYYA COEFFICIENT, COST DENSITY-SHAPING: A NEW CUMULANT-BASED CONTROL PARADIGM WITH APPLICATIONS TO SEISMIC PROTECTION  
M.J. Zyskowski, M.K. Sain, R.W. Diersing
- 265 EXPERIMENT OF A LEVERAGE-TYPE VARIABLE STIFFNESS ISOLATION SYSTEM FOR NEAR-FAULT SEISMIC ISOLATION  
Lyan-Ywan Lu, Shih-Yu Chu, Shih-Wei Yeh

# Technical Program

Wednesday, July 14

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## Keynote 7&8

8:30-9:30 Ohgi (4F)

- K-7** ADAPTIVE STIFFNESS SYSTEMS: RECENT DEVELOPMENTS IN STRUCTURAL CONTROL USING SEMIACTIVE / SMART VARIABLE STIFFNESS AND ADAPTIVE PASSIVE STIFFNESS  
S. Nagarajaiah
- K-8** STRUCTURAL DIAGNOSTICS AND PROGNOSTICS FOR PROACTIVE LIFE MANAGEMENT OF INFRASTRUCTURE  
Christian Boller, Gerd Dobmann, Jochen Kurz

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## Coffee Break

9:30-10:00 Takao (42F)

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## A-7: (OS) International Collaborative Projects

10:00-11:40 Fuji (42F)

*Co-Chair:* T. Oshima, *Co-Chair:* K. Ravisankar

- 041** RELIABILITY ASSESSMENT OF DAMAGE DETECTION OF REAL STEEL BRIDGE BY USING LOCAL EXCITATION METHOD (LEM)  
Rathish P. Kumar, T. Oshima, S. Mikami, Y. Miyamori, T. Yamazaki
- 042** WIRELESS TRANSMISSION MEASUREMENT OF STEEL BRIDGE BY USING LOCAL EXCITATION METHOD (LEM)  
T. Oshima, S. Mikami, Y. Miyamori, T. Yamazaki, Sherif Beskhyroun
- 043** DEVELOPMENT OF THE TESTBED FOR STRUCTURAL HEALTH MONITORING APPLICATION FOR INTERNATIONAL COLLABORATION  
K. Ban, Y. Miyamori, T. Oshima, T. Yamazaki, S. Mikami, B.F. Spencer Jr.
- 044** ADVANCED NON-DESTRUCTIVE TESTING METHODS FOR APPLICATION TO REINFORCED CONCRETE STRUCTURES- COLLABORATIVE RESEARCH BETWEEN SERC AND BAM  
P. Srinivasan, H. Wiggenhauser, S.G.N. Murthy, S. Bhaskar, K. Ravisankar, Nagesh R Iyer
- 045** INTERNATIONAL COLLABORATION TO DEVELOP A STRUCTURAL HEALTH MONITORING SYSTEM UTILIZING WIRELESS SMART SENSOR NETWORK AND ITS DEPLOYMENT ON A CABLE-STAYED BRIDGE  
T. Nagayama, H.-J. Jung, B.F. Spencer, Jr., S. Jang, K.A. Mechitov, S. Cho, M. Ushita, C.-B. Yun, G.A. Agha, Y. Fujino

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**B-7: (OS) Advances in Mechatronics**

10:00-11:40 Sagami (42F)

*Co-Chair: F. Casciati, Co-Chair: L. Faravalli*

- 086** *Session Keynote*  
FEED-FORWARD CONTROL OF BEAM VIBRATIONS BY PIEZOELECTRIC ACTUATOR-PATCHES IN THE FREQUENCY DOMAIN: THE RANGE OF VALIDITY OF OPTIMAL STATIC PLACEMENTS BY MOHR'S ANALOGY  
H. Irschik, M. Nader
- 087** MODELING, ANALYSIS AND CONTROL OF COUPLED ELASTIC STRUCTURES WITH THE FOCUS ON VIBRATION ATTENUATION  
Klaus Weichinger, Stefan Fuchshumer, Kurt Schlacher, Markus Schöberl
- 088** MULTICHANNEL CABLE REPLACEMENT FOR STRUCTURAL CONTROL APPLICATIONS  
S. Casciati, L. Faravelli, Z.C. Chen
- 089** GLOBAL VS LOCAL POSITIONING SYSTEMS  
F. Casciati, L.J. Wu
- 090** PIEZOELASTIC STRUCTURES INTERACTING WITH ELECTRIC NETWORKS: VIBRATION CANCELING AND SHAPE CONTROL  
J. Schoeftner, H. Irschik

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**C-7: (OS) Base-Isolated Bridges**

10:00-11:40 Tsukui (42F)

*Co-Chair: K. Kawashima, Co-Chair: I. Buckle*

- 131** SEISMIC RETROFITTING OF MONOLITHIC BRIDGES USING HYBRID ISOLATION  
Ian Buckle, Chunli Wei
- 132** IMPLEMENTATION OF SEISMIC ISOLATION FOR BRIDGES IN JAPAN  
S. Unjoh, M. Yabe, K. Kawashima
- 133** SEISMIC ISOLATION OF BRIDGES IN JAPAN  
K. Kawashima, S. Unjoh
- 134** A COMPARATIVE PERFORMANCE ASSESSMENT OF SUPERELASTIC-FRICTION BASE ISOLATORS FOR SEISMIC PROTECTION OF BRIDGE STRUCTURES  
Osman E. Ozbulut, Stefan Hurlebaus
- 135** STRUCTURAL CONTROL USING ADAPTIVE SPRING-DAMPER ISOLATION HAVING INTEGRAL GAPPING FUNCTION  
John C. Metzger, Douglas P. Taylor



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## **D-7: Methods of Structural Health Monitoring**

10:00-11:40 Mitake (42F)

*Co-Chair: K. Minagawa, Co-Chair: H. Guo*

- 176** SEISMIC DAMAGE MONITORING AND EVALUATION USING ENERGY BALANCE EQUATION  
K. Minagawa, S. Fujita, S. Kanaeda
- 177** STRUCTURAL STRESS IDENTIFICATION USING FUZZY PATTERN RECOGNITION AND INFORMATION FUSION TECHNIQUE  
J. Teng, T. Zhang, W. Lu
- 178** SUBSTRUCTURAL DAMAGE IDENTIFICATION USING TIME SERIES OF LOCAL MEASURED RESPONSE  
Jilin Hou, Łukasz Jankowski, Jinping Ou
- 179** LARGE-SCALE CAPACITANCE SENSOR FOR HEALTH MONITORING OF CIVIL STRUCTURES  
S. Laflamme, M. Kollosche, J.J. Connor, G. Kofod
- 180** STRUCTURAL DAMAGE DETECTION FOR STEEL ARCH BRIDGE BY USING A TWO-STAGE METHOD  
Huiyong Guo

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## **E-7: Passive and Semi-Active Control Systems**

10:00-11:40 Musashi (42F)

*Co-Chair: M. Liu, Co-Chair: H. Huang*

- 221** PHYSICAL MODELING OF HYSTERETIC BEHAVIOR OF MR DAMPERS  
X.C. Guan, P.F. Guo, J.P. Ou
- 222** INVESTIGATION ON MODELING OF MAGNETO-RHEOLOGICAL FLUID DAMPER COUPLED WITH STAY CABLE  
M. Liu, H. Li
- 223** PERFORMANCE EVALUATION OF MR DAMPER FOR VIBRATION MITIGATION OF LONG STAY CABLE  
Xiaolu Jiang, Hongwei Huang, Limm Sun, Wei Cheng
- 224** COMPARISON OF 200 KN MR DAMPER MODELS FOR USE IN REAL-TIME HYBRID SIMULATION  
Zhaoshuo Jiang, Dominick Manton, Richard Christenson, Yunbyeong Chae, James Ricles, Anthony Friedman, Shirley Dyke, Brian Phillips, B. F. Spencer
- 225** EXPERIMENTAL AND NUMERICAL INVESTIGATION OF A PRACTICAL BASE ISOLATION SYSTEM FOR LIGHT-FRAME WOOD BUILDINGS  
J.W. van de Lindt, H. Liu, M.D. Symans, J.K. Shinde

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**F-7: Novel Mass Dampers**

10:00-11:40 Tama (42F)

*Co-Chair: K. Tamura, Co-Chair: A. F. Rod*

- 266 DEVELOPMENT OF HIGH PERFORMANCE VERTICAL ISOLATION FLOOR SYSTEM WITH ROTARY INERTIA MASS DEVICES  
R. Maseki, I. Nagashima, A. Nii, T. Nakajima
- 267 PERFORMANCE OF A MASS DAMPER SYSTEM WITH A PENDULUM AND INVERTED PENDULUM MECHANISM  
T. Sone, M. Yamamoto
- 268 RESPONSE CHARACTERISTICS OF A STRUCTURE WITH A VIBRATION CONTROL SYSTEM USING ROTATING INERTIA MASS  
K. Tamura, K. Isoda, Y. Nakamura
- 269 SINGLE UNIT IMPACT DAMPER IN HARMONIC AND IMPULSIVE VIBRATIONS  
S. Mehdi Zahrai, Amir F. Rod
- 270 THE INNOVATIVE CONTROL METHOD AND ITS APPLICATION FOR STRUCTURAL TORSION MOTION AND VIBRATION  
Chunwei Zhang, Jilong Li, Jiaqiu Liu, Jinping Ou

**Lunch**

11:40-13:00 Moon Light, Orion, Commet, Subaru, Star Light (43F)

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**A-8: (OS) Multifunctional Materials for Smart Structure Applications**

13:00-14:40 Fuji (42F)

*Co-Chair: S. Nagarajaiah, Co-Chair: J. Lynch*

- 046 PIEZOCERAMIC-BASED WIRELESS SENSOR NETWORK SYSTEM FOR HEALTH MONITORING OF WIND TURBINE BLADE - AN EXPERIMENTAL STUDY  
Gangbing Song, Hui Li, Bosko Gajic, Wensong Zhou, Peng Chen, Haichang Gu
- 047 DEVELOPMENT OF A MULTI-CHANNEL WIRELESS IMPEDANCE ANALYZER FOR MULTIFUNCTIONAL MATERIAL-BASED SENSING  
Erik Jarva, Sukhoon Pyo, Jerome P. Lynch
- 048 STRAIN SENSING USING A POLYSTYRENE-MWCNT BASED NANOCOMPOSITE  
V.S.M. Vemuru, R.K. Srivastava, A. Srivastava, S. Nagarajaiah, P.M. Ajayan
- 049 A NEW SEMI-ACTIVE/PASSIVE ISOLATOR  
Majid Behrooz, Xiaojie Wang, Faramarz Gordaninejad
- 050 REPAIR OF A SQUARE DELAMINATED PLATE UNDER A STATIC LOADING  
N. Wu, Q. Wang

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## **B-8: (OS) Hybrid Simulation of Large Structural Systems and MR Dampers**

13:00-14:40 Sagami (42F)

*Co-Chair: A. K. Agrawal, Co-Chair: Y. Takahashi*

- 091** MODEL-BASED REAL-TIME HYBRID SIMULATION STRATEGIES FOR LARGE-SCALE TESTING  
Brian M. Phillips, B.F. Spencer
- 092** REAL-TIME HYBRID SIMULATION BENCHMARK STUDY WITH A LARGE-SCALE MR DAMPER  
Brian M. Phillips, Zhaoshuo Jiang, James M. Ricles, Shirley J. Dyke, Yunbyeong Chae, B.F. Spencer, Richard E. Christenson, Anil Agrawal
- 093** PERFORMANCE EVALUATION OF AN ACTUATOR DELAY COMPENSATION TECHNIQUE USING LARGE-SCALE MAGNETO-RHEOLOGICAL FLUID DAMPERS SUBJECTED TO VARIABLE CURRENT INPUTS  
C. Chen, J.M. Ricles, R. Sause, R. Christenson

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## **C-8: Advanced Damage Detection Method**

13:00-14:40 Tsukui (42F)

*Co-Chair: H. Yun, Co-Chair: W.P. Sung*

- 136** EXPERIMENTAL AND NUMERICAL STUDIES ON ACCURATE DAMAGE LOCATION BASED ON THE SDLV METHOD  
Yonghui An, Jinping Ou
- 137** STUDY OF RESPONSE SURFACE METHOD OF RADIAL BASIS FUNCTION BASED ON THE DYNAMIC ANALYSIS OF A CBALE-STAYED BRIDGE  
Linren Zhou, Jinping Ou
- 138** DEVELOPMENT OF DIGITAL IMAGINE CORRELATION METHOD TO DETECT THE REAL-TIME DYNAMIC RESPONSE OF BUILDING UNDER EXCITATION  
W.P. Sung, M.H. Shih, H. Huang, F.J. Tsai
- 139** DATA-DRIVEN TECHNIQUES OF PERFORMANCE-RELATED MONITORING FOR GEOTECHNICAL STRUCTURES SUBJECT TO ENVIRONMENTAL CHANGE  
Hae-Bum Yun, Sami F. Masri, Lakshmi N. Reddi, Jung-Seok Lee

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## **D-8: System Identification of Buildings**

13:00-14:40 Mitake (42F)

*Co-Chair: C. Loh, Co-Chair: T. Saito*

- 181** STUDY ON DAMAGE IDENTIFICATION OF INFRASTRUCTURES BY USING AE MONITORING DATA  
T. Obata, Y. Asaka, Y. Miyamori, K. Moriwaka
- 182** IMPROVED STIFFNESS-DAMPING SIMULTANEOUS IDENTIFICATION OF BUILDINGS INCLUDING UNKNOWN INNER VIBRATION SOURCE BASED ON ARX MODEL  
S. Yoshitomi, T. Maeda, I. Takewaki

- 183 SYSTEM IDENTIFICATION OF STORY-ISOLATION BUILDING FROM BOTH AMBIENT AND EARTHQUAKE RESPONSE DATA  
Chin-Hsiung Loh, Jian-Huang Weng, Chia-Hui Chen
- 184 STRUCTURAL LOCAL DAMAGE IDENTIFICATION BY USING DYNAMICAL CHARACTERISTIC OF BUILDING  
T. Nakane, Y. Kitagawa
- 185 HEALTH DIAGNOSTICS OF A SEISMIC ISOLATED BUILDING USING CHANGES IN ITS DYNAMIC CHARACTERISTICS  
T. Saito, M. Shiraishi

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## E-8: Structural Control Device

13:00-14:40 Musashi (42F)

*Co-Chair: Z. Rakicevic, Co-Chair: H. Zhou*

- 226 SHAKING TABLE TESTING OF A STEEL FRAME STRUCTURE WITHOUT AND WITH GERB PRESTRESSED DAMPING DEVICES  
Z. Rakicevic, A. Bogdanovic, D. Jurukovski, H. Kammerer, P. Nawrotzki
- 227 STUDY ON THE RESEARCH AND DEVELOPMENT OF INTERACTION STRUCTURAL CONTROL DEVICE  
M. H. Shih, W.P. Sung
- 228 DEVELOPMENT OF SLITTED STEEL SHEAR WALLS FOR STRUCTURAL CONDITION ASSESSMENT  
A. Jacobsen, M. Nakashima
- 229 DAMPING OF TAUT CABLE WITH A DISCRETE DAMPER AND SPRING  
H. Zhou, L. Sun, W. Ding
- 230 RE-CENTERING VARIABLE FRICTION DEVICE FOR SEISMIC PROTECTION OF STRUCTURES AGAINST NEAR-FIELD EARTHQUAKES  
Osman E. Ozbulut, Stefan Hurlebaus

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## F-8: Active and Semi-Active Mass Damper

13:00-14:40 Tama (42F)

*Co-Chair: I. Takewaki, Co-Chair: I. M. Diaz*

- 271 FUNDAMENTAL MECHANISM OF EARTHQUAKE RESPONSE REDUCTION IN BUILDING STRUCTURES WITH INERTIAL DAMPERS  
I. Takewaki, S. Murakami, S. Yoshitomi, M. Tsuji
- 272 ACTIVE VIBRATION CONTROL STUDY OF AN IN-SERVICE FOOTBRIDGE USING AN INERTIAL PROOF-MASS ACTUATOR  
I.M. Díaz, C.M. Casado, J. de Sebastián
- 273 FAULT TOLERANT CONTROL OF BUILDING STRUCTURES BASED ON LMI  
L.S. Huo, C.X. Qu, H.N. Li, G. Li

- 274 EFFECTS OF DAMPING DEVICE NONLINEARITY ON THE PERFORMANCE OF SEMIACTIVE TUNED MASS DAMPERS  
C. Lindh, S. Laflamme, J.J. Connor
- 275 SMART TMD: ADAPTIVE LENGTH PENDULUM DAMPERS  
S. Nagarajaiah, D.T.R. Pasala, C. Huang

Coffee Break

14:40-15:10 Takao (42F)

## A-9: Vibration Analysis and Control

15:10-16:50 Fuji (42F)

*Co-Chair:* K. Sasajima, *Co-Chair:* T. Watanabe

- 051 EFFECTIVENESS OF COMPENSATION ALGORITHM FOR ACTIVE MASS DAMPER  
K. Sasajima, A. Kubo, T. Yasuda, N. Yamaura, T. Tsukitani
- 052 CONNECTED CONTROL METHOD APPLIED TO ORDINARY AND BASE ISOLATED STRUCTURES  
T. Watanabe, S. Fukuchi, K. Matsumaru, K. Seto
- 053 THE INFLUENCE OF PRE-ESTABLISHED FORCE ON THE ACOUSTICS OF A VIOLIN  
L. Klepal, A. Mita
- 054 RESEARCH AND DEVELOPMENT OF MASS DAMPER FOR EXCAVATORS  
K. Sakakibara, S. Fujita, K. Minagawa, Y. Tsuyuki, D. Oono, T. Nagatsuka

## C-9: Monitoring of Structural Performance

15:10-16:50 Tsukui (42F)

*Co-Chair:* Y. Xia, *Co-Chair:* E. A. Johnson

- 141 TEMPERATURE DISTRIBUTION AND TEMPERATURE-INDUCED DISPLACEMENT OF TSING MA SUSPENSION BRIDGE  
Y. Xia, B. Chen, Y.L. Xu
- 142 SLOW STRUCTURAL DEFORMATION MONITORING USING LOCATA - A CASE STUDY AT THE TUMUT POND DAM  
Mazher Choudhury, Nonie Politi, Chris Rizos
- 143 STRUCTURAL HEALTH MONITORING WITH A DISTRIBUTED MASS DAMPER SYSTEM  
Tat S. Fu, Erik A. Johnson
- 144 PRINCIPAL COMPONENT ANALYSIS BASED MODAL IDENTIFICATION FOR FRAME STRUCTURES: EXPERIMENTAL STUDIES  
Zhi Sun, Ning Hou, Cheng Chen
- 145 QUANTIFICATION OF NOTCH-TYPE DAMAGE IN A TWO-STOREY FRAMED STRUCTURE UTILISING FREQUENCY RESPONSE FUNCTIONS AND ARTIFICIAL NEURAL NETWORKS  
U. Dackermann, J. Li, B. Samali

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## D-9: System Identification of Structures

15:10-16:50 Mitake (42F)

*Co-Chair:* T. Honma, *Co-Chair:* L. Ren

- 186 DAMAGE LOCATION IDENTIFICATION FOR BOLT LOOSENESS IN FLANGE JOINT OF TOWER BODY IN HIGH-RISE STEEL TUBE TOWER STRUCTURE  
Wei-lian QU, Zhong-shan He, Wen-Ke Qin
- 187 APPLICATION OF A DIRECT SEARCH METHOD FOR DAMAGE IDENTIFICATION OF PLATE-LIKE STRUCTURES  
A. Bagheri, G. Ghodrati Amiri, S.A. Seyed Razzaghi
- 188 SEISMIC RESPONSE PREDICTION METHOD CONSIDERING HEAT-MECHANICS INTERACTION BEHAVIOR OF LEAD RUBBER BEARING  
T. Honma, A. Kondo, Y. Takenaka, H. Kitamura
- 189 CRACKING AND FAILURE MONITORING BY FIBER BRAGG GRATING SENSOR IN SMALL-SCALE DAM MODEL  
Liang Ren, Hong-Nan Li, Dan-Dan Zhang
- 190 AMBIENT VIBRATION ANALYSIS USING A MODE INDICATOR BASED METHOD  
C.J. Ku, Y. Tamura, A. Yoshida

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## E-9: Rubber Bearings and Metal Rubbers

15:10-16:50 Musashi (42F)

*Co-Chair:* E. Takaoka, *Co-Chair:* J. Li

- 231 THE EFFECT OF GEOMETRICAL NONLINEARITY ON THE BUCKLING BEHAVIOR OF LAMINATED RUBBER BEARINGS  
Isao Nishimura, Satoshi Suzuki
- 232 THE EXPERIMENTAL STUDY ON THE NONLINEAR BUCKLING STABILITY OF LAMINATED RUBBER BEARINGS  
Satoshi Suzuki, Isao Nishimura
- 233 MECHANICAL CHARACTERISTICS OF A TWO-TIERED LAMINATED RUBBER BEARING FOR ACTUALIZING LARGE DEFORMATION CAPACITY  
E. Takaoka, N. Sato, Y. Takenaka, S. Furukawa, M. Kuno, R. Shimamoto
- 234 STUDY ON THEORETIC MODEL OF METALLIC RUBBER BASED ON CONTACTED MICRO-BEAMS THEORY AND FINITE ELEMENT SIMULATION  
C.X. Mao, S.C. Li, W.T. Wang, H. Li, Y.G.B. Zhao
- 235 SUMMARY OF METAL RUBBER NONLINEAR MECHANICS MODEL  
Jilong Li, Chunwei Zhang, Yunfei Liao, Jinping Ou

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**F-9: Response Control**

15:10-16:50 Tama (42F)

*Co-Chair:* T. Furuhashi, *Co-Chair:* B. Wu

- 276 SEISMIC DAMAGE CONTROL OF A NONLINEAR BENCHMARK BUILDING USING MR DAMPERS  
Zhong-Xian Li, Yang Lv, Long-He Xu, Yang Ding
- 277 BASIC STUDY OF THE STRUCTURAL CONTROL SYSTEM WITH NEGATIVE STIFFNESS  
K. Shimizu, H. Kurino
- 278 RESPONSE CONTROL DESIGN METHOD BY MAKING USE OF DYNAMIC MASS  
T. Furuhashi, I. Hata, S. Ishimaru
- 279 PERFORMANCE OF STRUCTURES INCORPORATING MR DAMPERS WITH PSEUDO-NEGATIVE STIFFNESS  
B. Wu, P. Shi, J. Ou
- 280 BUFFETING RESPONSE CONTROL OF CABLE-STAYED BRIDGE UNDER CONSTRUCTION STAGE USING MULTI-DISTRIBUTED TMDS  
Y.K. Wen, L.M. Sun

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**Closing Ceremony**

16:50-17:20 Fuji (42F)







# 5WCSCM

Fifth World Conference on  
Structural Control and Monitoring

