
# General Program

## SHMII-5 2011

### 5th International Conference on Structural Health Monitoring of Intelligent Infrastructure

11-15 December 2011
The Ritz-Carton Hotel
Cancún, Quintana Roo, México

ISHMII
International Society for Structural Health Monitoring of Intelligent Infrastructure

# Sponsors


Instituto de Ingeniería
Circuito Escolar s/n
Ciudad Universitaria
CP 04510, México D.F.
México
Tel: +52(55) 5623-3600
sitios.iingen.unam.mx



Km. 12 Carr. Querétaro-Galindo
Sanfandila Mpio. de Pedro Escobedo
76702 Querétaro
México
Tel: +52(442) 216-9777
Fax: +52(442) 216-9671
buzon@imt.mx
www.imt.mx


Ródano #14
Col. Cuauhtémoc
06598 México, D.F.
México
Tel: +52(55) 5229-4400
Fax: +52(55) 5553-6682
servicioalcliente@cfe.gob.mx
oww.cfe.gob.mx


Sociedad Mexicana de
Ingeniería Estructural, A.C.
Camino a Santa Teresa No.
187
Col. Parques del Pedregal
Tlalpan 14010 México DF
Tel 5665 9784
Fax 5528 5975
www.smie.org.mx
smie1@prodigy.net.mx


Av. Nativitas 429
16090 Xochimilco D.F.
México
Tel: +52(55) 5334-0330
Fax: +52(55) 5334-0331
mexpresa@mexpresa.com
www.mexpresa.com


Micron Optics, Inc.
1852 Century Place NE
Atlanta, GA 3034
USA
Tel: +1.404.325.0005
Fax: +1.404.325.4082
info@micronoptics.com
www.micronoptics.com


Av. Marina Nacional 329
Torre Ejecutiva Piso 41
Col. Petróleos Mexicanos
C.P. 11311, Del. Miguel
Hidalgo
México, D.F.
México
Tel: +52(55) 1944-2500
www.pemex.com

# Organizing Committee

**Chair:**

| | |
|---|---|
| Sergio M. Alcocer | Instituto de Ingeniería, UNAM, México |

**Co-Chairs:**

| | |
|---|---|
| Francisco Carrión | Mexican Institute of Transportation (IMT), México |
| Roberto Gómez-Martínez | Instituto de Ingeniería, UNAM, México |

**Head of International**
Steering Committee:

| | |
|---|---|
| Alexis Méndez | MCH Engineering LLC, USA |

# Local Organizing Committee

**Coordinators:**

| | |
|---|---|
| David Murià-Vila | Instituto de Ingeniería, UNAM, México |
| J. Alberto Escobar | Instituto de Ingeniería, UNAM, México |
| Gerardo Aguilar Ramos | Instituto de Ingeniería, UNAM, México |

**Members:**

| | |
|---|---|
| Norma Aviña-Lemus | SMIE Cancún, México |
| Pedro Castro Borges | CINVESTAV, Yucatán, México |
| Roberto Centeno-Lara | Autonomous University of Yucatán (UAY), México |
| Ramsés Rodríguez | National Polytechnic Institute (IPN), México |
| Andrés A. Torres | Mexican Institute of Transportation (IMT), México |

# International Scientific Committee

| | |
|---|---|
| Farhad Ansari (chairman) | University of Illinois at Chicago |
| Aftab Mufti (co-chairman) | ISIS Canada |
| Ahmet Emin Aktan | Drexel Intelligent Infrastructure and Transportation Safety Institute (DI3) |
| Sreenivas Alampalli | New York State Department of Transportation |
| Ashutosh Bagchi | Concordia University |
| Baidar Bakht | J.M.B.T. Structures Research Inc. |
| Pradipta Banerji | Indian Institute of Technology, Bombay |
| Nemkumar Banthia | University of British Columbia |
| Roman Berger | Mageba |
| Konrad Bergmeister | BOKU – U of Natural Resources & Applied Life Sciences |
| James Brownjohn | University of Sheffield |
| Fritz Brunner | Graz University of Technology |
| Pedro Castro | Instituto Politécnico Nacional |
| J.J. Roger Cheng | University of Alberta |
| Alessandro De Stefano | Politecnico di Torino |
| Dan M. Frangopol | Fazlur R. Khan Endowed Chair of Structural Engineering and Architecture |
| Hitoshi Furuta | Kansai University |
| Wolfgang Habel | Federal Institute for Materials Research and Testing (BAM) |
| Daniele Inaudi | Smartec SA |
| Vistasp Karbhari | University of California, San Diego |
| Jan-Ming Ko | Hong Kong Polytechnic University |
| Chan Ghee Koh | National University of Singapore |
| Hyun-Moo Koh | Seoul National University |
| Pierre Labossière | Université de Sherbrooke |
| Urs Meier | EMPA |
| Ayaho Miyamoto | Yamaguchi University |
| Masoud Motavalli | EMPA |
| John Newhook | Dalhousie University |

| | |
|---|---|
| Toshiyuki Oshima | Kitami Institute of Technology |
| Jinping Ou, Harbin | Institute of Technology |
| Charles Sikorsky | California Department of Transportation |
| Ian Smith | Swiss Federal Institute of Technology (EPFL) |
| Paul S. Sumitro | Smart Structures, LLC |
| Humberto Varum | University of Aveiro |
| Zhishen Wu | Ibaraki University |
| You-lin Xu | Hong Kong Polytechnic University |

## SHMII-5 Chairs

**Keynote Lecture Chairs**

| | |
|---|---|
| Farhad Ansari | University of Illinois at Chicago |
| Sergio M. Alcocer | Instituto de Ingeniería, UNAM, México |
| Alexis Méndez | MCH Engineering LLC, USA |
| You-lin Xu | Hong Kong Polytechnic University |
| Paul S. Sumitro | Smart Structures, LLC |
| John Newhook | Dalhousie University |

**Short Course and Workshop Chair**

| | |
|---|---|
| Alexis Méndez | MCH Engineering LLC, USA |

**Session Chairs**

| | |
|---|---|
| Gerardo Aguilar Ramos | Instituto de Ingeniería, UNAM, México |
| Sergio M. Alcocer | Instituto de Ingeniería, UNAM, México |
| Farhad Ansari | University of Illinois at Chicago, USA |
| Enrique Bazán Zurita, DiGioia | Gray & Associates, LLC, USA |
| Roman Berger | Mageba, Switzerland |
| Francisco J. Carrión | IMT, México |
| Filippo Casarin | University of Padova, Italy |
| Genda Chen | Missouri University of Science and Technology, USA |
| David de León | Universidad Autónoma del Estado de México, México |
| Hans de Backer | Ghent University, Belgium |
| Alessandro De Stefano | Politecnico di Torino, Italy |
| José Alberto Escobar | Instituto de Ingeniería, UNAM, México |
| Branko Glisic | Princeton University, USA |

| | |
|---|---|
| Roberto Gómez | Instituto de Ingeniería, UNAM, México |
| Wolfgang Habel | Federal Institute for Materials Research and Testing (BAM), Germany |
| Daniele Inaudi | Smartec SA, Switzerland |
| Katerina Krebber | Federal Institute for Materials Research and Testing (BAM), Germany |
| José Alfredo López | IMT, México |
| Miguel Martínez | IMT, México |
| Urs Meier | EMPA Swiss Federal Laboratories for Materials Science and Technology, Switzerland |
| Roberto Meli | Instituto de Ingeniería, UNAM, México |
| Alexis Méndez | MCH Engineering LLC, USA |
| Aftab Mufti | ISIS Canada |
| David Murià-Vila | Instituto de Ingeniería, UNAM, México |
| John Newhook | Dalhousie University, Canada |
| Jinping Ou, Harbin | Institute of Technology, China |
| Didem Ozevin | University of Illinois at Chicago, USA |
| Alfredo Chávez Plascencia | Aalborg University, Denmark |
| David Potter | National Instruments, USA |
| Juan A. Quintana | IMT, México |
| Ramsés Rodríguez-Rocha | ESIA, IPN, México |
| Ian Smith | Swiss Federal Institute of Technology (EPFL), Switzerland |
| Alfred Strauss | University of Natural Resources and Life Sciences; Austria |
| Paul Sumitro | Smart Structures, USA |
| Hwayaw Tamn | The Hong Kong Polytechnic University, Hong Kong SAR |
| Thomas Tannert | Bern University of Applied Sciences, Switzerland |
| Douglas Thomson | ISIS Canada / University of Manitoba, Canada |
| Phillippe Van Bogaert | Ghent University, Belguim |
| Helmut Woschitz | Graz University of Technology, Austria |

# Keynote Lectures

- **INTERPRETATION OF CORROSION MONITORING FROM EMBEDDED SENSORS**
  Carmen Andrade
  Institute of Construction Science Eduardo Torroja Spain

- **COST-BENEFITS ANALYSIS IN SHM PROJECTS**
  Daniele Inaudi
  Roctest Group
  Switzerland

- **STRUCTURAL HEALTH MONITORING BY SMART TECHNICAL TEXTILES BASED ON FIBER OPTIC SENSORS**
  Katerina Krebber
  BAM Federal Institute for Materials Research and Testing
  Germany

- **RESEARCH AND PRACTICE ON STRUCTURAL HEALTH EVALUATION OF ANCIENT STONE MASONRY BUILDINGS IN MEXICO**
  Roberto Meli
  Instituto de Ingeniería, UNAM
  Mexico

- **OUT OF THE LAB, INTO THE FIELD: INTEGRATING MODERN SHM SYSTEMS ON REAL-WORLD STRUCTURES**
  David Potter
  National Instruments
  USA

- **THE AMAZING VERSATILITY OF FIBRE BRAGG GRATING SENSORS FOR INFRASTRUCTURE MONITORING**
  Hwayaw Tam
  The Hong Kong Polytechnic University
  Hong Kong SAR

# Courses

**Short Course on SHM**
Structural health monitoring (SHM) is a process aimed at providing accurate and in-time information concerning structural health condition and performance. The information obtained from monitoring is generally used to increase the safety, plan and design maintenance activities, verify hypotheses, reduce uncertainty, and to widen the knowledge concerning the structure being monitored.

Recent developments in fiber optic sensing (FOS) technologies made possible global structural monitoring using long-gauge sensors and integrity monitoring using truly distributed sensors. These sensors combined in appropriate topologies and networks can provide for assessment of wide range of parameters relevant for structural behavior.

The aim of this course is to transfer the knowledge on SHM and FOS. Targeted groups are those who can take benefits from SHM: civil engineers, practitioners, consultants, contractors, infrastructure managers, and owners. Researchers on SHM are welcome too.

Covered topics include brief introduction to the SHM, overview of available FOS technologies, and SHM methods based on FOS technologies. The topics are illustrated through numerous examples taken from practice.

**Instructional Workshop: Optical Fiber Bragg Grating Sensing Technology for SHM**
The instructional workshop is the hands-on, experimental portion of the short course. This workshop will review the use and application of FBG sensors for strain & stress, acceleration, displacement, temperature and other parameters is made, along with discussions on sensor placement and installation, data analysis and interpretation. To reinforce the theoretical concepts and illustrate the practical aspects of the technology, a number of hands-on demonstrations of FBG sensors and instruments will be made.

This course will enable the participant to:

- Understand the operating principles, characteristics and advantages of optical fiber Bragg grating (FBG) sensors
- Review a wide range of sensor types for the measurement of materials properties and structural characteristics
- Learn the required building blocks that make up a SHM system
- Illustrate specific sensing solutions and their benefits in applications for civil structures, aerospace, composite materials, FRP elements, railways, naval vessels, oil and gas, and others.
- Obtain an overall view of fiber sensors, the SHM industry and its trends

## Topics

**1 Sensors and Instrumentation**

1.1 Sensors Technology
1.2 Wireless Sensing
1.3 Advanced Sensor Networks and Integrated Systems
1.4 Indirect Sensing
1.5 Smart Sensors
1.6 Energy Harvesting for SHM of Civil Infrastructure
1.7 Calibration of Sensors and Sensor Systems

**2 Signal Processing and Data Management**

2.1 Data Mining
2.2 Image Based Sensors and Analysis
2.3 Measurement, Data Processing and Analysis

**3 Structural Identification and Model Calibration**

3.1 Wave Propagation
3.2 Vibration and Modal Based Techniques
3.3 Inverse Problems
3.4 Neural Networks
3.5 Genetic Optimization Algorithms
3.6 Modeling and Simulation

**4 Structural Health Monitoring and Evaluation**

- 4.1 Emerging Needs for Health Monitoring Techniques
- 4.2 Non-Destructive Testing
- 4.3 Bridge Monitoring and Inspection
- 4.4 Monitoring of Heritage Structures
- 4.5 SHM of Intelligent Infrastructure
- 4.6 SHM Systems
- 4.7 Structural Analysis and Modeling
- 4.8 Innovations in Civil Structural Health Monitoring

**5 Structural Safety and Prognosis**

- 5.1 Safety Analysis
- 5.2 Damage Identification and Location
- 5.3 Risk Assessment
- 5.4 Structural Life Prognosis
- 5.5 Reliability Assessment
- 5.6 Deterioration Models and Simulations

**6 Vibration Control and Damping**

- 6.1 Active and Semi-Active Control for Structural Systems
- 6.2 Damping Systems for Intelligent Infrastructure
- 6.3 Smart Materials and Structures

**7 Practical Applications**

- 7.1 Field Applications
- 7.2 SHM for Bridge Management Systems
- 7.3 Applications of Bridge Weigh In Motions Systems
- 7.4 SHM for Heritage Structures

**8 Damage Control, Repair and Strengthening**

- 8.1 Damage Control, Repair and Strengthening

# Technical Sessions

| Number | Title | Room | Time |
|---|---|---|---|
| **Monday December 12** | | | |
| 1 | Sensors Technology 1 | 1 | 10:30 to 12:30 |
| 2 | Bridge Monitoring and Inspection 1 | 2 | |
| 3 | Civil Structural Health Monitoring | 3 | |
| 4 | Damage Identification and Risk Assessment | 4 | |
| 5 | Sensors Technology 2 | 1 | 14:30 to 16:30 |
| 6 | Bridge Monitoring and Inspection 2 | 2 | |
| 7 | Bridge Inspection and Analysis | 3 | |
| 8 | Modeling and Analysis | 4 | |
| 9 | Damage Control, Repair and Strengthening | 1 | 17:00 to 18:00 |
| 10 | Monitoring of Heritage Structures | 2 | |
| 11 | Field Applications 1 | 3 | |
| 12 | Damage Identification and Location | 4 | |
| **Tuesday December 13** | | | |
| 13 | Sensors Technology 3 | 1 | 10:00 to 12:00 |
| 14 | Bridge Monitoring and Inspection 3 | 2 | |
| 15 | SHM of Intelligent Infrastructure and Field Applications | 3 | |
| **Wednesday December 14** | | | |
| 16 | Advanced Sensors and Data Mining | 1 | 10:30 to 12:30 |
| 17 | Field Applications 2 | 2 | |
| 18 | Vibration and Inverse Techniques 1 | 3 | |
| 19 | Reliability Assessment | 1 | 14:30 to 16:30 |
| 20 | Measurement, Data Processing and Analysis 1 | 2 | |
| 21 | Vibration and Inverse Techniques 2 | 3 | |

| Thursday December 15 | | | |
|---|---|---|---|
| 22 | Measurement, Data Processing and Analysis 2 | 1 | 9:30 to 11:30 |
| 23 | Monitoring and Non-Destructive Testing | 2 | |
| 24 | Field Applications 3 | 3 | |

# Daily Program

| Monday, December 12 | | | | |
|---|---|---|---|---|
| | **Room 1** | **Room 2** | **Room 3** | **Room 4** |
| 8:00 - 15:00 | Registration | | | |
| 8:30 - 9:00 | Opening Ceremony | | | |
| 9:00 - 10:00 | Keynote Lecture | | | |
| 10:00 - 10:30 | Coffee Break | | | |
| 10:30 - 12:30 | Session 1: Sensors Technology | Session 2: Bridge Monitoring and Inspection | Session 3: Civil Structural Health Monitoring | Session 4: Damage Identification and Risk Assessment |
| 12:30 - 13:30 | Lunch | | | |
| 13:30 - 14:30 | Keynote Lecture | | | |
| 14:30 - 16:30 | Session 5: Sensors Technology | Session 6: Bridge Monitoring and Inspection | Session 7: Bridge Inspection and Analysis | Session 8: Modeling and Analysis |
| 16:30 - 17:00 | Coffee Break | | | |
| 17:00 - 18:00 | Session 9: Damage Control, Repair and Strengthening | Session 10: Monitoring of Heritage Structures | Session 11: Field Applications | Session 12: Damage Identification and Location |

# Daily Program

| Tuesday, December 13 | | | |
|---|---|---|---|
| | **Room 1** | **Room 2** | **Room 3** |
| 8:00 - 12:00 | Registration | | |
| 8:00 - 9:00 | Keynote Lecture | | |
| 9:00 - 9:30 | Plenary Session | | |
| 9:30 - 10:00 | Coffee Break | | |
| 10:00 - 12:00 | Session 13: Sensors Technology | Session 14: Bridge Monitoring and Inspection | Session 15: SHM of Intelligent Infrastructure and Field Applications |
| 12:00 - 12:30 | Boxed Lunch Pickup and Boarding of Buses | | |
| 12:30 - 18:00 | Lunch, Tour and Conference Dinner | | |

| Wednesday, Dec 14 | | | |
|---|---|---|---|
| | **Room 1** | **Room 2** | **Room 3** |
| 8:00 - 10:00 | Registration | | |
| 9:00 - 10:00 | Keynote Lecture | | |
| 10:00 - 10:30 | Coffee Break | | |
| 10:30 - 12:30 | Session 16: Advanced Sensors and Data Mining | Session 17: Field Applications | Session 18: Vibration and Inverse Techniques |
| 12:30 - 13:30 | Lunch | | |
| 13:30 - 14:30 | Keynote Lecture | | |
| 14:30 - 16:10 | Session 19: Reliability Assessment | Session 20: Measurement, Data Processing and Analysis | Session 21: Vibration and Inverse Techniques |

# Daily Program

| Thursday, Dec 15 | | | |
|---|---|---|---|
| | **Room 1** | **Room 2** | **Room 3** |
| 8:00 - 9:00 | Keynote Lecture | | |
| 9:00 - 9:30 | Coffee Break | | |
| 9:30 - 11:30 | Session 22: Measurement, Data Processing and Analysis | Session 23: Monitoring and Non-Destructive Testing | Session 24: Field Applications |
| 11:30 - 12:00 | General Issues | | |
| 12:00 - 12:30 | Closing Ceremony | | |

# Detailed Daily Program

## Sunday
**December 11**

| | |
|---|---|
| 8:00 - 15:00 | Registration |
| 8:30 - 17:00 | ISHMII Council Meeting<br>Tulum Room |
| 9:40 - 11:40 | Short Course on SHM (Part I) |
| 11:40 - 12:00 | Coffee Break |
| 12:00 - 14:00 | Short Course on SHM (Part II) |
| 14:00 - 14:20 | Lunch |
| 14:20 - 17:00 | Instructional Workshop:<br>Optical Fiber Bragg Grating Sensing Technology for SHM |
| 18:00 -20:00 | Welcome Reception<br>Pool Area |

## Monday
**December 12**

| | |
|---|---|
| 8:00 - 15:00 | Registration |
| 8:30 - 9:00 | Opening Ceremony |
| 9:00 - 10:00 | Keynote Lecture<br>COST-BENEFITS ANALYSIS IN SHM PROJECTS<br>Daniele Inaudi |
| 10:00 - 10:30 | Coffee Break |
| 10:30 - 12:30 | Oral Sessions 1-4<br>Rooms 1- 4 |
| 12:30 - 13:30 | Lunch |
| 13:30 - 14:30 | Keynote Lecture<br>RESEARCH AND PRACTICE ON STRUCTURAL HEALTH EVALUATION OF ANCIENT STONE MASONRY BUILDINGS IN MEXICO<br>Roberto Meli |
| 14:30 - 16:30 | Oral Sessions 5-8<br>Rooms 1- 4 |
| 16:30 - 17:00 | Coffee Break |
| 17:00 - 18:00 | Oral Sessions 9-12<br>Rooms 1- 4 |

# Room 1 / Monday, December 12

**Session 1: Sensors Technology 1**
Chair: Aftab Mufti
Co-chair: David Murià-Vila

| | |
|---|---|
| 10:30 - 10:50 | Topic 1.5<br>EXPERIMENTAL STUDY ON DEVELOPING SMART ANCHOR HEAD<br>Young-Jun You, Ki-Tae Park, Kyu-Wan Lee |
| 10:50 - 11:10 | Topic 1.7<br>PARAMETER ESTIMATION FOR A CONCRETE BEAM FROM EXPERIMENTS USING FIBER-OPTIC STRAIN GAGES<br>Pradipta Banerji, Sanjay Chikermane, Richard Scott, Ken Grattan, Tong Sun, Fredric Surre |
| 11:10 - 11:30 | Topic 1.1<br>EXPERIMENTAL STUDY OF A SOIL-EMBEDDED FIBRE OPTIC STRAIN SENSOR CROSSING AN ARTIFICIAL SHEAR ZONE<br>Dominik Hauswirth, Michael Iten, Alexander M. Puzrin |
| 11:30 - 11:50 | Topic 1.2<br>MONITORING OF MOISTURE IN MASONRY STONES USING A WIRELESS LC RESONANT SENSOR<br>Jun Hui Zhao, Douglas John Thomson, Mohammod Udin, Aftab Mufti |
| 11:50 - 12:10 | Topic 1.5<br>RESEARCH ON BOTDR/A BASED DISTRIBUTED OPTICAL SENSING TECHNIQUE IN STRUCTURAL HEALTH MONITORING<br>Xuefeng Zhao, Le Li, Yusong Gong, Xiyong Ye, Xingyue Su |
| 12:10 - 12:30 | Topic 1.1<br>REVIEW OF FIBER OPTIC SENSORS AND PZT TRANSDUCERS FOR MONITORING OF CONCRETE STRUCTURES IN NUCLEAR INDUSTRY<br>Amir Mosavi, Hassan Sedarat, Maria Guimaraes |

# Room 1 / Monday, December 12

**Session 5: Sensors Technology 2**
Chair: Hans de Backer
Co-chair: Alfredo Chávez Plascencia

| | |
|---|---|
| 14:30 - 14:50 | Topic 1.2<br>WIRELESS SENSOR NETWORK SYSTEMS FOR STRUCTURAL HEALTH MONITORING OF BUILDING STRUCTURE<br>Marian Gizejowski, Edward Antoszkiewicz, Stanislaw Wierzbicki, Zbigniew Pioro |
| 14:50 - 15:10 | Topic 1.5<br>IMPEDANCE-BASED SMART AGGREGATE FOR DAMAGE MONITORING IN A CONCRETE GRAVITY DAM MODEL<br>Xin Feng, Yaoguo Shen, Talagbe Dandjekpo, Tong Zhu, Jing Zhou |
| 15:10 - 15:30 | Topic 1.2<br>DESIGN OF LOW COST WIRELESS SENSOR NETWORK FOR HEALTH MONITORING OF LARGER STRUCTURES<br>Prasad Chougule, Alfredo Plascencia |
| 15:30 - 15:50 | Topic 1.2<br>WIRELESS STRAIN MEASUREMENTS IN SHIELD-DRIVEN TUNNELS<br>Ken Schotte, Hans de Backer, Philippe Van Bogaert |
| 15:50 - 16:10 | Topic 1.1<br>DYNAMIC AND ADAPTIVE MULTI-POINT FIBER OPTIC ACOUSTIC EMISSION SENSOR (FAESENSE™) SYSTEM<br>Edgar Mendoza, John Prohaska, Connie Kempen, Yan Esterkin, Sunjian Sun, Sridhar Krishnaswamy |
| 16:10 - 16:30 | Topic 1.1<br>AMPLIFIER DESIGN FOR AN EXTENSOMETER IN HIGH TEMPERATURE DEFORMATION MONITORING<br>Xiaoyin Hu, Jiuhong Jia, Shantung Tu |

# Room 1 / Monday, December 12

**Session 9: Damage Control, Repair and Strengthening**
Chair: Enrique Bazán Zurita
Co-chair: José Alfredo López

| | |
|---|---|
| 17:00 - 17:20 | Topic 8.1<br>CONTRIBUTION TO RETROFITTING CONCRETE STRUCTURES BY EXTERNAL REINFORCING SYSTEM<br>Amando Padilla Ramírez, Antonio Flores Bustamante, Iván Panamá Armendariz, Francisco González Díaz |
| 17:20 - 17:40 | Topic 8.1<br>MITIGATION AND MONITORING OF STRUCTURAL DISTRESS IN AN ELECTRICAL SUBSTATION DUE TO MINE SUBSIDENCE<br>Enrique Bazan-Zurita, Phil Glogowsky, Paul Cass, Alan Nichols |
| 17:40 - 18:00 | Topic 8.1<br>DATA ACQUISITION AND ANALYTICAL MODEL FOR DESIGN OF FRP RETROFITTED RC BEAM-COLUMN JOINTS<br>Seyed Saeed Mahini |

# Room 2 / Monday, December 12

**Session 2: Bridge Monitoring and Inspection**
Chair: Philippe Van Bogaert
Co-chair: Roberto Gómez

| | |
|---|---|
| 10:30 - 10:50 | Topic 4.3<br>EXPERIMENTAL INVESTIGATION OF DRIVE-BY BRIDGE INSPECTION<br>Chul-Woo Kim, Ryo Isemoto, Tatsuaki Toshinami, Mitsuo Kawatani, Patrick Mc Getrick, Eugene O Brien |
| 10:50 - 11:10 | Topic 4.3<br>REMOTE STRUCTURAL MONITORING SYSTEMS - PROVIDING LONG-TERM CONFIDENCE IN A STRUCTURE'S CONDITION<br>Roman Berger, Gianni Moor, Thomas Spuler, Carlos Mendez |
| 11:10 - 11:30 | Topic 4.3<br>ACCURACY OF LOAD TEST ON A DOUBLE-CURVED CLOSED SECTION STEEL VIADUCT<br>Philippe Van Bogaert |
| 11:30 - 11:50 | Topic 4.3<br>ISSUES AND SOLUTIONS ASSOCIATED WITH REMOTE SENSING APPLICATIONS FOR BRIDGE MONITORING<br>Shen-En Chen, Edd Hauser, Chuck Boyle, Kelly Rehm |
| 11:50 - 12:10 | Topic 4.3<br>BRIDGE MONITORING WITH FIBER OPTICS TECHNOLOGY. AN EXAMPLE OF DYNAMIC TRAFFIC LOAD MONITORING IN MEXICAN BRIDGES<br>Juan José Orozco y Orozco, Leonardo Bounatian-Benatov, Fernando Sánchez-Domínguez |
| 12:10 - 12:30 | Topic 4.3<br>MONITORING BASED PERFORMANCE INDICATORS FOR THE ASSESSMENT OF JOINTLESS BRIDGE STRUCTURE<br>Alfred Strauss, Roman Wender, Dan M. Frangopol |

# Room 2 / Monday, December 12

**Session 6: Bridge Monitoring and Inspection**
Chair: Thomas Tannert
Co-chair: Gerardo Aguilar

| | |
|---|---|
| 14:30 - 14:50 | Topic 4.3<br>REMOTE MOISTURE MONITORING OF TIMBER BRIDGES<br>Thomas Tannert, Roman Berger, Mareike Vogel |
| 14:50 - 15:10 | Topic 4.3<br>DAMAGE ASSESSMENT OF RC SLABS USING A PRACTICAL ENSEMBLE SYSTEM FOR MULTIPLE FEATURE SELECTION<br>Nakatsu Koichiro, Furuta Hitoshi, Nomura Yasutoshi, Takahashi Kyosuke, Ishibashi Ken, Hayakawa Yuji |
| 15:10 - 15:30 | Topic 4.3<br>FLEXURAL-SHEAR FAILURE OF A FULL SCALE TESTED RC BRIDGE STRENGTHENED WITH NSM CFRP<br>Björn Täljsten, Jonny Nilimaa, Gabriel Sas, Thomas Blanksvärd |
| 15:30 - 15:50 | Topic 4.3<br>STRUCTURAL HEALTH MONITORING OF THE INDIAN RIVER INLET BRIDGE<br>Harray W. Tripp Shenton III, Patrick Daniel Carson, Gary Wenczel, Michael J. Chajes |
| 15:50 - 16:10 | Topic 4.3<br>EXPERIENCES WITH SHM FOR LARGE CIVIL STRUCTURES<br>Hans de Backer, Amelie Outtier, Ken Schotte, Dries Stael, Wim Nagy, Philippe Van Bogaert |
| 16:10 - 16:30 | Topic 4.3<br>ONE YEAR VIBRATION MONITORING OF A SHORT SPAN BRIDGE UNDER IN-SERVICE ENVIRONMENTS<br>Chul-Woo Kim, Toshiki Sakakibara, Ryo Isemoto, Heng Salpisoth, Yoshinobu Oshima, Kunitomo Sugiura |

# Room 2 / Monday, December 12

**Session 10: Monitoring of Heritage Structures**
Chair: Filippo Casarin
Co-chair: Roberto Meli

| | |
|---|---|
| 17:00 - 17:20 | Topic 4.4<br>CONCEPT AND DESIGN OF A WIRELESS REMOTE MONITORING SYSTEM FOR THE AQUEDUCT OF QUERETARO<br>Roberto Alvarado-Cardenas, Alejandro Aragon-Zavala, Eduardo Rosado Colmenares, Cesar Cardenas Perez, Francisco Javier Carrión-Viramontes |
| 17:20 - 17:40 | Topic 4.4<br>STRUCTURAL HEALTH MONITORING OF HISTORICAL BUILDINGS: PREVENTIVE AND POST-EARTHQUAKE CONTROLS<br>Filippo Casarin |
| 17:40 - 18:00 | Topic 4.4<br>THE MONITORING OF BARCELONA'S SAGRADA FAMILIA CHURCH WITH FIBER OPTIC TECHNOLOGY. CONTROL OF THE CONSTRUCTION OF A NEARBY TUNNEL<br>Leonardo Bounatian-Benatov, Fernando Sánchez-Domínguez, Ignacio Poy-Lopez |

# Room 3 / Monday, December 12

**Session 3: Civil Structural Health Monitoring**
Chair: Genda Chen
Co-chair: José Alberto Escobar

| | |
|---|---|
| 10:30 - 10:50 | Topic 4.8<br>STRUCTURAL HEALTH MONITORING IN CIVIL INFRASTRUCTURE APPLICATIONS - NEW PERSPECTIVES<br>Genda Chen |
| 10:50 - 11:10 | Topic 4.8<br>SATELLITE SENSING TECHNOLOGY TO MONITOR BRIDGES AND OTHER CIVIL INFRASTRUCTURES<br>Daniel Cusson, Parwant Ghuman, Andrian Mccardle |
| 11:10 - 11:30 | Topic 4.8<br>EXPERIMENTAL TESTS OF REINFORCED CONCRETE BUILDINGS AND ENEA DYSCO VIRTUAL LABORATORY<br>Marialuisa Mongelli, Gerardo de Canio, Ivan Roselli, Massimiliano Baldini, Alessandro Colucci, Francesco Di Biagio, Alessandro Picca, Angelo Tatì, Nicolò Cancelliere, Luigi Coniglio, Aurelio Ghersi |
| 11:30 - 11:50 | Topic 4.8<br>A PROVEN STANDARD FOR BRIDGE HEALTH MONITORING SYSTEMS<br>Alexandre Chaperon, Gilles Hovhanessian |
| 11:50 - 12:10 | Topic 4.8<br>DYNAMIC CHARACTERIZATION OF CIVIL STRUCTURES USING MOBILE SENSORS<br>Johannio Marulanda, Juan Martín Caicedo, Peter Thomson |
| 12:10 - 12:30 | Topic 4.7<br>MONITORING OF WIND VELOCITIES AND THEIR USE TO STUDY THE WIND-INDUCED STRUCTURAL BEHAVIOR OF THE BALUARTE BRIDGE DURING CONSTRUCTION STAGE<br>Adrián Pozos-Estrada, Roberto Gómez-Martínez, Raúl Sánchez-García, Luis Martín Arenas-García, José Alberto Escobar-Sánchez |

# Room 3 / Monday, December 12

**Session 7: Bridge Inspection and Analysis**
Chair: Branko Glisic
Co-chair: Alfred Strauss

| | |
|---|---|
| 14:30 - 14:50 | Topic 4.3<br>MONITORING AND VISUAL INSPECTION OF NEW JERSEY REFERENCE BRIDGES<br>Di Su, Dionysius M Siringoringo, Tomonori Nagayama, Yozo Fujno |
| 14:50 - 15:10 | Topic 4.3<br>STRUCTURAL HEALTH MONITORING OF STEEL AND COMPOSITE BRIDGES IN RUDBAR-MANJIL REGION IN IRAN<br>Mehdi Mohammadpour Lima |
| 15:10 - 15:30 | Topic 4.7<br>MEASURING GEOMETRICAL OUT-OF-PLANE IMPERFECTIONS IN STEEL TIED ARCH BRIDGES<br>Amelie Outtier, Hans de Backer, Bart de Pauw, Philippe Van Bogaert |
| 15:30 - 15:50 | Topic 4.3<br>STREICKER BRIDGE: ASSESSMENT OF STRUCTURAL HEALTH CONDITION THROUGH STATIC AND DYNAMIC MONITORING<br>Branko Glisic, David Hubbel, Dorotea Sigurdardottir, Jeremy Chen, Jose Pedro Sousa Afonso |
| 15:50 - 16:10 | Topic 4.2<br>EXPERIMENTALLY DETERMINED STOCHASTIC PROPERTIES OF CONCRETE<br>Alfred Strauss, Herwig Mayer, David Lehky, Dan M. Frangopol |
| 16:10 - 16:30 | Topic 5.2<br>ESTIMATION OF STRUCTURAL HEALTH IN CONCRETE BRIDGE DECKS: A STUDY CASE<br>Antonio Javier Garcia Palencia, Erin Santini-Bell |

# Room 3 / Monday, December 12

**Session 11: Field Applications 1**
Chair: Hwayaw Tamm
Co-chair: Sergio M. Alcocer

| | |
|---|---|
| 17:00 - 17:20 | Topic 7.1<br>FIELD MONITORING OF REINFORCED CONCRETE BRIDGE BARRIERS REINFORCED WITH GFRP AND STEEL BARS<br>Ehab Ahmed, Jean-Francois Claude, Brahim Benmokrane, Daniel Cusson |
| 17:20 - 17:40 | Topic 7.1<br>LONG-TERM MONITORING OF LAUIER-TACHE PARKING GARAGE USING DIFFERENT SENSORS AND TECHNIQUES<br>Ehab Ahmed, Brahim Benmokrane, Allan Wiseman |
| 17:40 - 18:00 | Topic 7.1<br>MONITORING OF A LARGE DIAMETER PILE LOAD TEST WITH OPTICAL STRANDS. BRIDGE OVER THE RIVER RIO NEGRO (BRAZIL)<br>Fernando Sánchez-Domínguez, Leonardo Bounatian-Benatov, Carlos Henrique Souza Da Silva |

**Session 4: Damage Identification and Risk Assessment**
Chair: Roman Berger
Co-chair: Ramsés Rodriguez-Rocha

| | |
|---|---|
| 10:30 - 10:50 | Topic 5.2<br>DAMAGE DETECTION IN BUILDINGS CONSIDERING SOIL-STRUCTURE INTERACTION, UTILIZING THE BASELINE STIFFNESS METHOD<br>Josué García Solano, Ramsés Rodríguez Rocha |
| 10:50 - 11:10 | Topic 5.2<br>A COMPARISON BETWEEN TWO WAVELET BASED DAMAGE DETECTION APPROACHES TO FIND CRACKS IN A BEAM SUBJECTED TO A MOVING LOAD<br>Amir Khorram, Firooz Bakhtiari Nezhad, Mohsen Rezaeian |
| 11:10 - 11:30 | Topic 5.2<br>RELIABILITY ISSUES IN DAMAGE IDENTIFICATION VIA STRUCTURAL HEALTH MONITORING<br>Andrea del Grosso, Francesca Lanata |
| 11:30 - 11:50 | Topic 5.2<br>COMPARISON OF SIGNAL PROCESSING METHODS: ICA AND WAVELET; MODAL PARAMETERS EXTRACTION<br>Jose Rodrigo Pacheco Vivero, Eduardo Gomez Ramirez, Francisco José Rivero Angeles, Ramsés Rodríguez Rocha, Mauricio Martínez |
| 11:50 - 12:10 | Topic 5.3<br>DIAGNOSIS AND PROGNOSIS OF STONECUTTERS BRIDGE BASED ON STRUCTURAL HEALTH MONITORING SYSTEM<br>Songye Zhu, You-Lin Xu, Kai-Yuen Wong, Yue Zhen, Shunlong Li, Wen-Feng Huang, Liang Hu |
| 12:10 - 12:30 | Topic 5.2<br>NDE BY MEANS OF AUTOMATED STRUCTURAL HEALTH MONITORING - SAVING COSTLY BRIDGE REPAIR WORKS<br>Roman Berger, Thomas Spuler, Gianni Moor, Carlos Mendez |

# Room 4 / Monday, December 12

**Session 8: Modeling and Analysis**
Chair: Douglas Thomson
Co-chair: Francisco Carrión

| | |
|---|---|
| 14:30 - 14:50 | Topic 3.3<br>RESTORING FORCE AND EXCITATION IDENTIFICATION FOR A NONLINEAR SYSTEM WITH DUFFING OSCILLATOR<br>Jia He, Bin Xu, Sami F. Masri |
| 14:50 - 15:10 | Topic 3.6<br>ASSESSMENT OF A CASE STUDY SUBWAY NATM TUNNEL DESIGN MODEL BASE ON FIELD MEASUREMENT RESULTS<br>Mohammad Mehdi Amiri |
| 15:10 - 15:30 | Topic 3.5<br>IMPLEMENTATION OF GENETIC ALGORITHMS IN A SYSTEM IDENTIFICATION METHOD FOR INSTRUMENTED BUILDINGS<br>José Camargo, David Murià-Vila |
| 15:30 - 15:50 | Topic 3.3<br>AN EFFECTIVE METHOD FOR LOCATING DAMAGE ELEMENTS BY PARALLEL OPTIMIZATION OF FINITE ELEMENT MODEL PARAMETERS<br>Zheng Yi Wu, Guoqing Xu |
| 15:50 - 16:10 | Topic 3.3<br>IDENTIFICATION OF SUBSTRUCTURAL VIBRATION PROPERTIES FROM GLOBAL MEASUREMENTS<br>Yong Xia, Shun Weng, You-Lin Xu |
| 16:10 - 16:30 | Topic 3.1<br>SYSTEM IDENTIFICATION AND RESPONSE PREDICTION USING IMPULSE RESPONSE FROM AMBIENT NOISE MEASUREMENTS OF INSTRUMENTED BUILDINGS IN SINGAPORE<br>Haitao Zheng, Kusnowidjaja Megawati |

**Session 12: Damage Identification and Location**
Chair: John Newhook
Co-chair: Didem Ozevin

| | |
|---|---|
| 17:00 - 17:20 | Topic 5.2<br>ASSESSMENT OF BURIED PIPELINES HEALTH CONDITION USING DISTRIBUTED FIBER OPTIC SENSORS<br>Branko Glisic, Yao Yao, Kai Oberste-Ufer |
| 17:20 - 17:40 | Topic 5.2<br>VIBRATION-BASED DETECTION OF SUPPORT DETERIORATION UNDER A SIMPLY SUPPORTED TIMBER BRIDGE<br>Cameron J Beauregard, Leon D Wegner, Bruce F Sparling |
| 17:40 - 18:00 | Topic Topic 5.2<br>IMPROVED ACOUSTIC EMISSION SOURCE LOCALIZATION WITH PROBABILISTIC METHODS<br>Didem Ozevin |

# Detailed Daily Program

## Tuesday
**December 13**

| | |
|---|---|
| 8:00 - 12:00 | Registration |
| 8:00 - 9:00 | Keynote Lecture<br>STRUCTURAL HEALTH MONITORING BY SMART TECHNICAL TEXTILES BASED ON FIBER OPTIC SENSORS<br>Katerina Krebber |
| 9:00 - 9:30 | Plenary Session<br>AFTAB MUFTI MEDAL AND BEST PAPER AWARDS<br>Farhad Ansari |
| 9:30 - 10:00 | Coffee Break |
| 10:00 - 12:00 | Oral Sessions 13-15<br>Rooms 1-3 |
| 12:00 - 12:30 | Boxed Lunch Pickup and Boarding of Buses |
| 12:30 - 18:00 | Lunch, Tour and Conference Dinner |

**Session 13: Sensors Technology 3**
Chair: Katerina Krebber
Co-chair: David Potter

| | |
|---|---|
| 10:00 - 10:20 | Topic 1.6<br>POWERING WIRELESS SENSORS VIA REGENERATIVE ELECTROMAGNETIC TMD<br>Wenai Shen, Songye Zhu, Yu-lin Xu |
| 10:20 - 10:40 | Topic 1.3<br>MEMSCON PROJECT: WIRELESS SENSOR NETWORK FOR POST-EARTHQUAKE EVALUATION OF CONCRETE BUILDINGS<br>Matthaios Bimpas, Angelos Amditis, Stamatia Frondistou, Vasilis Kalidromitis, Davide Trapani, Daniele Zonta, Yorgos Stratakos, Anastasios Gkaretsos |
| 10:40 - 11:00 | Topic 1.1<br>FBG BASED EMBEDDABLE STRAIN SENSOR: NEW DEVELOPMENT<br>Julien Tremblay, Hany Tobbi, Brahim Benmokrane |
| 11:00 - 11:20 | Topic 1.1<br>SENSING SHEET FOR SHM BASED ON LARGE AREA ELECTRONICS<br>Branko Glisic, Naveen Verma, Yao Yao |
| 11:20 - 11:40 | Topic 1.5<br>RUGGED BLOCK-BASED DISPLACEMENT MONITORING FOR STRUCTURES UNDER EXTREME ENVIRONMENT<br>Shenghua Jiang, Zhi Zhou, Minghua Huang, Jinping Ou |
| 11:40 - 12:00 | Topic 1.3<br>POLYMERBASED PIEZOELECTRIC MODULES BY MICROINJECTION MOULDING TECHNOLOGY FOR SHM<br>Michael Heinrich, Robert Schulze, Michael Wegener, Lothar Kroll, Marco Walther, Martin Schuller, Thomas Gebner |

# Room 2 / Tuesday, December 13

**Session 14: Bridge Monitoring and Inspection 3**
Chair: Farhad Ansari
Co-chair: Alexis Méndez

| | |
|---|---|
| 10:00 - 10:20 | Topic 4.3<br>MEASUREMENT SYSTEM DESIGN FOR DAMAGE DETECTION USING MODEL-FREE DATA INTERPRETATION METHODS<br>Irwanda Laory, Thanh N. Trinh, Nizar Bel Hadj Ali, Ian F. C. Smith |
| 10:20 - 10:40 | Topic 4.3<br>ALARM SETTING METHODOLOGY FOR THE MONITORING OF CABLES IN A STAYED BRIDGE<br>Juan Antonio Quintana-Rodríguez, Francisco Javier Carrión-Viramontes, José Alfredo López-López, Didier Samayoa Ochoa |
| 10:40 - 11:00 | Topic 4.3<br>A SHM-ORIENTED TEST-BED FOR LONG-SPAN SUSPENSION BRIDGES:SETTLEMENT STUDY<br>You-Lin Xu, Xiaohua Zhang, Songye Zhu, Sheng Zhan, Hwayaw Tam, Hoyin Au |
| 11:00 - 11:20 | Topic 4.3<br>SHM APPLICATION FOR MONITORING OF EXISTING BRIDGE PIER DURING CONSTRUCTION OF A WATER CHANNEL ADJACENT TO PIER FOUNDATION<br>Vidya Limaye |
| 11:20 - 11:40 | Topic 4.3<br>APPLICATION OF FBG SENSORS TO MONITOR THE CABLE FORCES IN A SMALL-SCALE CABLE-STAYED BRIDGE MODEL<br>Xin Feng, Zhe Fan, Jian Hu, Liang Ren, Jing Zhou |

# Room 3 / Tuesday, December 13

**Session 15: SHM of Intelligent Infrastructure and Field Applications**
Chair: Paul Sumitro
Co-chair: Roberto Gómez

| | |
|---|---|
| 10:00 - 10:20 | Topic 4.5<br>MONITORING OF CORROSION PROTECTION IN REINFORCED CONCRETE STRUCTURES USING AN INTEGRATED PH OPTODE<br>Ralf Roeben, Roland Huettl, Mathis Kuchejda, Wolfgang R. Habel, Marek Hoehse |
| 10:20 - 10:40 | Topic 4.5<br>COMMERCIAL REMOTE SENSING AND SPATIAL INFORMATION TECHNOLOGIES IN TRANSPORTATION<br>Caesar Singh |
| 10:40 - 11:00 | Topic 4.5<br>INTEGRATION FOR TRADITIONAL AND NON-TRADITIONAL REMOTE SENSING TECHNOLOGIES INTO STRUCTURAL HEALTH MONITORING FOR LONG-TERM CONDITION ASSESSMENT<br>Tess Ahlborn, D.K. Harris, C.N. Brooks, L.I. Sutter |
| 11:00 - 11:20 | Topic 4.5<br>EYE IN THE SKY: ISSUES WITH SUB-INCH AERIAL IMAGING OF BRIDGE DECKS<br>Shen-En Chen, Chuck Boyle, Meenu Natarajan, Edd Hauser |
| 11:20 - 11:40 | Topic 4.5<br>CORROSION MONITORING BY UTILIZING EM TECHNOLOGY<br>Paul Sumitro |
| 11:40 - 12:00 | Topic 7.1<br>BRICK CHIMNEY REAL-TIME MONITORING REINFORCEMENT WITH AN EXTERNAL POST-TENSIONING SYSTEM<br>Carles Cots |

# Detailed Daily Program

## Wednesday
**December 14**

| | |
|---|---|
| 8:00 - 10:00 | Registration |
| 9:00 - 10:00 | Keynote Lecture<br>INTERPRETATION OF CORROSION MONITORING FROM EMBEDDED SENSORS<br>Carmen Andrade |
| 10:00 - 10:30 | Coffee Break |
| 10:30 - 12:30 | Oral Sessions 16-18<br>Rooms 1-3 |
| 12:30 - 13:30 | Lunch |
| 13:30 - 14:30 | Keynote Lecture<br>THE AMAZING VERSATILITY OF FIBRE BRAGG GRATING SENSORS FOR INFRASTRUCTURE MONITORING<br>Hwayaw Tam |
| 14:30 - 16:10 | Oral Sessions 19-21<br>Rooms 1-3 |

**Session 16: Advanced Sensors and Data Mining**
Chair: Daniele Inaudi
Co-chair: Gerardo Aguilar

| | |
|---|---|
| 10:30 - 10:50 | Topic 1.3<br>LOCALIZATION OF INSTABILITY ZONES IN LEVEES, LANDSLIDES, SINKHOLES AND TUNNELS WITH DISTRIBUTED OPTICAL FIBER SENSORS<br>Daniele Inaudi, Riccardo Belli |
| 10:50 - 11:10 | Topic 1.3<br>DISTRIBUTED REMOTE WIRELESS BRIDGE MONITORING SYSTEM<br>Jian Su, Jinquan Zhang, Yulong Zhu, Jian Mao, Wanheng Li, Shuri Cai |
| 11:10 - 11:30 | Topic 1.2<br>DESIGN AND EXPERIMENTAL VALIDATION OF LOW-FREQUENCY WIRELESS VIBRATION DATA ACQUISITION SYSTEM FOR OFFSHORE PLATFORM<br>Yan Yu, Zhirui Li, Jie Wang, Jinping Ou |
| 11:30 - 11:50 | Topic 1.7<br>EXPERIMENTAL VERIFICATION OF A NOVEL LOAD DEPENDENT SENSOR PLACEMENT METHOD<br>Dongsheng Li |
| 11:50 - 12:10 | Topic 2.1<br>SHM DATA MANAGEMENT SYSTEM USING MYSQL DATABASES AND MATLAB INTERFACES<br>Ki-Young Koo, Nicky de Battista, James M. W. Brownjohn |

# Room 1 / Wednesday, December 14

**Session 19: Reliability Assessment**
Chair: David de León
Co-chair: Juan A. Quintana

| | |
|---|---|
| 14:30 - 14:50 | Topic 5.4<br>PROGNOSIS AND RELIABILITY ANALYSIS OF A STAYED BRIDGE USING MONTE CARLO SIMULATION<br>Francisco Javier Carrión-Viramontes, Juan Antonio Quintana-Rodríguez, José Alfredo López-López |
| 14:50 - 15:10 | Topic 5.5<br>FATIGUE AND RELIABILITY ANALYSIS OF LONG SPAN SUSPENSION BRIDGES WITH SHMS<br>You-Lin Xu, Zhi-Wei Chen, Yong Xia |
| 15:10 - 15:30 | Topic 5.5<br>PROBABILISTIC STRUCTURAL HEALTH ASSESSMENT OF AEROSPACE STRUCTURES<br>Jose Garcia, Carlos Ferregut, Shu Guo, Michael Cowan |
| 15:30 - 15:50 | Topic 5.5<br>VEHICULAR BRIDGES PIERS RELIABILITY: THE CASE OF THE STATE OF MEXICO<br>David Joaquin Delgado Hernandez, Juan Carlos Arteaga-Arcos, David de Leon Escobedo, Jair Gonzalez Rojas, Jose Omar Jimenez Miranda, Luis Horacio Martinez Martinez, Jose Emmanuel Rivero Santana |
| 15:50 - 16:10 | Topic 5.6<br>ANALYSIS OF DETERIORATION DUE TO FATIGUE AND PROGNOSIS OF A TYPICAL CONCRETE BRIDGE, USING MONTE CARLO SIMULATION<br>Saúl Enrique Crespo Sánchez, Francisco Javier Carrión-Viramontes, Miguel Ángel Pérez Lara y Hernández |

**Session 17: Field Applications 2**
Chair: Helmut Woschitz
Co-chair: David Murià-Vila

| | |
|---|---|
| 10:30 - 10:50 | Topic 4.6<br>STRUCTURAL HEALTH MONITORING OF A HIGH SPEED RAILWAY VIADUCT<br>Justo Carretero Pérez, Javier Cortezo García |
| 10:50 - 11:10 | Topic 7.1<br>VALIDATING DATA PRIOR TO INTERPRETATION TO MINIMIZE UNCERTAINTY IN MANAGEMENT DECISIONS<br>Joshua Levy, John Newhook, Peter Buckland |
| 11:10 - 11:30 | Topic 7.1<br>EXAMPLE OF A SERBIAN-FRENCH COLLABORATION IN THE FIELD OF INFRASTRUCTURE MANAGEMENT<br>Alexandre Chaperon |
| 11:30 - 11:50 | Topic 7.1<br>DEVELOPMENT OF A RAIL STRAIN PAD USING FBG<br>Helmut Woschitz |
| 11:50 - 12:10 | Topic 7.1<br>TRANSANDEAN PIPELINES GEOHAZARD PREVENTION WITH DISTRIBUTED FIBER OPTIC SENSING<br>Fabien Ravet, Edilberto Gutierrez Ortiz |
| 12:10 - 12:30 | Topic 7.1<br>AUTOMATIC PORTABLE SYSTEM FOR FAULT DETECTION IN THE PAVEMENT OF ROADS AND BRIDGES USING WIRELESS SENSORS AND GLOBAL POSITION SYSTEM (GPS)<br>Alfonso Poncela, Victor de Diego, Antolín Lorenzana, Jesús de Sebastián |

# Room 2 / Wednesday, December 14

**Session 20: Measurement, Data Processing and Analysis 1**
Chair: Wolfgang Habel
Co-chair: Ramsés Rodríguez-Rocha

| | |
|---|---|
| 14:30 - 14:50 | Topic 2.3<br>VALIDATION OF STRAIN SENSORS TO ACHIEVE RELIABLE MEASUREMENT RESULTS<br>Wolfgang R. Habel, Vivien G. Schukar |
| 14:50 - 15:10 | Topic 2.3<br>ACOUSTIC SIGNAL DISCRIMINATION IN PRESTRESSED CONCRETE ELEMENTS BASED ON STATISTICAL CRITERIA<br>Malgorzata Kalicka, Thomas Vogel |
| 15:10 - 15:30 | Topic 2.3<br>NUMERICAL STUDY IN THE OPTIMAL POSITION OF SENSORS FOR MODAL PARAMETERS EXTRACTION IN WELDED STEEL CATENARY RISERS<br>Victor Felipe Hernandez-Abraham, Ramsés Rodríguez Rocha, Francisco Javier Rivero-Angeles, Alberto Omar Vázquez-Hernández |
| 15:30 - 15:50 | Topic 2.3<br>NUMERICAL EVALUATION OF WAVELET BASED DAMAGE DETECTION METHODOLOGIES APPLIED TO RC MEMBERS<br>Luis R Velázquez, Luis A Montejo |

**Session 18: Vibration and Inverse Techniques 1**
Chair: Ian Smith
Co-chair: Francisco Carrión

| | |
|---|---|
| 10:30 - 10:50 | Topic 3.3<br>GENERATING ALTERNATIVES FROM MULTIPLE MODELS: HOW TO INCREASE ROBUSTNESS IN PARAMETRIC SYSTEM IDENTIFICATION<br>Emiliano Matta, Alessandro de Stefano |
| 10:50 - 11:10 | Topic 3.3<br>LOAD ESTIMATION OF IMPACT LOADS FROM STRAIN RESPONSE DATA FOR A MODEL BRIDGE USING AN OUTPUT-ONLY DATA APPROACH<br>Sanjay Chikermane, Pradipta Banerji, Bulusu Vishwanath |
| 11:10 - 11:30 | Topic 3.3<br>PREVENTION OF OVER-INSTRUMENTATION DURING THE DESIGN OF A MONITORING SYSTEM<br>James-A. Goulet, Ian F. C. Smith |
| 11:30 - 11:50 | Topic 3.2<br>POST-EARTHQUAKE DYNAMIC BEHAVIOR OF A CONCRETE BUILDING<br>Giacomo Buffarini, Paolo Clemente, Fernando Saitta |
| 11:50 - 12:10 | Topic 3.2<br>PERIOD VARIATIONS IN A SHEAR WALL BUILDING DUE TO EARTHQUAKE SHAKING<br>Ruben Boroschek, Rodrigo Carreno |
| 12:10 - 12:30 | Topic 3.3<br>PIECEWISE LINEAR AND NONLINEAR RESTORING FORCE IDENTIFICATION OF A MDOF DYNAMIC SYSTEM<br>Guokai Yuan, Bin Xu, Sami F. Masri |

# Room 3 / Wednesday, December 14

**Session 21: Vibration and Inverse Techniques 2**
Chair: Genda Chen
Co-chair: Alexis Méndez

| | |
|---|---|
| 14:30 - 14:50 | Topic 3.2<br>EVALUATION OF THE STRUCTURAL HEALTH AND CONDITION FOR FUTURE MODIFICATIONS AND ENHANCEMENT OF LIFE CYCLE OF A STEEL BRIDGE IN MÉXICO BASED ON THE EVOLUTION OF ITS DYNAMIC PROPERTIES<br>A Gustavo Ayala |
| 14:50 - 15:10 | Topic 3.2<br>A STUDY ON THE DYNAMIC RESPONSE OF A CRACKED BEAM SUBJECTED TO A MOVING LOAD<br>Amir Khorram, Firooz Bakhtiari Nezhad, Mohsen Reazaeian |
| 15:10 - 15:30 | Topic 3.2<br>EXPERIMENTAL TESTS AND SEISMIC PERFORMANCE OF A CONCRETE BRIDGE<br>Paolo Clemente, Nicola Impollonia, Fernando Saitta, Stefano Zito |
| 15:30 - 15:50 | Topic 3.2<br>A HILBERT TRANSFORM METHOD FOR SYSTEM IDENTIFICATION OF TIME-VARYING STRUCTURES<br>Zuocai Wang, Genda Chen |

# Detailed Daily Program

## Thursday
**December 15**

| | |
|---|---|
| 8:00 - 9:00 | Keynote Lecture<br>OUT OF THE LAB, INTO THE FIELD: INTEGRATING MODERN SHM SYSTEMS ON REAL-WORLD STRUCTURES<br>David Potter |
| 9:00 - 9:30 | Coffee Break |
| 9:30 - 11:30 | Oral Sessions 22-24<br>Rooms 1-3 |
| 11:30 - 12:00 | General Issues |
| 12:00 - 12:30 | Closing Ceremony |
| 14:00 - 17:00 | JCSHM Editorial Board Meeting<br>Tulum Room |

**Session 22: Measurement, Data Processing and Analysis**
Chair: Jinping Ou
Co-chair: José Alberto Escobar

| | |
|---|---|
| 9:30 - 9:50 | Topic 2.3<br>SHM MEASUREMENT STABILITY AND COMPENSATION METHODS<br>Dean Mc Neill |
| 9:50 - 10:10 | Topic 2.3<br>INSTRUMENTATION AND MONITORING OF AN EXISTING SUBWAY LINE DURING CONSTRUCTION OF A NEW SUBWAY LINE IN MEXICO CITY<br>Jesús Morelos Reyes, Yolanda Alberto-Hernández, Elías Antolín Tavera Gutiérrez |
| 10:10 - 10:30 | Topic 2.3<br>STRUCTURAL DAMAGE DETECTION USING MEASURED FREQUENCY RESPONSE FUNCTION (FRF) DATA AND ARTIFICIAL NEURAL NETWORKS (ANNS)<br>Rupika P. Bandara, Tommy Hung Tin Chan, David P. Thambiratnam |
| 10:30 - 10:50 | Topic 2.3<br>RECORDING TIMBER BRIDGE GIRDER DEFLECTIONS USING A LASER REFERENCE SOURCE AND A HIGH SPEED CAMERA<br>John C. Moore, Seyed Saeed Mahini, Rex Glencross-Grant, Robert Patterson |
| 10:50 - 11:10 | Topic 2.3<br>DATA LOSS RECOVERY FOR WIRELESS SENSOR NETWORKS BASED ON COMPRESSIVE SAMPLING TECHNIQUES<br>Yuequan Bao, Hui Li, Jinping Ou |

**Session 23: Monitoring and Non-Destructive Testing**
Chair: Alessandro De Stefano
Co-chair: Ramsés Rodríguez-Rocha

| | |
|---|---|
| 9:30 - 9:50 | Topic 4.2<br>EMBEDDED PIEZOELECTRIC SELF SENSING-BASED SMART NDT TECHNIQUES FOR CONCRETE STRENGTH EVALUATION<br>Seunghee Park, Dong-Jin Kim, Changgil Lee, Seok-Inn Hong |
| 9:50 - 10:10 | Topic 4.2<br>EFFECTS OF TEMPERATURE VARIATION IN ASSESSING THE INTERFACE DELAMINATION BETWEEN CONCRETE AND REBAR USING ULTRASONIC GUIDED WAVES<br>Tao Ruan, Dongsheng Li |
| 10:10 - 10:30 | Topic 4.3<br>MONITORING OF THOMPSON'S BRIDGE BFRP REINFORCED DECK WITH DISCRETE OPTICAL SENSORS<br>Susan E. Taylor, M Sonebi, D Robinson, S Grattan, Tong Sun |
| 10:30 - 10:50 | Topic 4.3<br>MONITORING OF A NOVEL FLEXIARCH BRIDGE SYSTEM WITH SOIL-STRUCTURE INTERACTION<br>M Lydon, Susan E. Taylor, V Sivakukar, D Hughes |
| 10:50 - 11:10 | Topic 4.2<br>STRUCTURE-INTEGRATED FIBRE OPTIC ACOUSTIC EMISSION SENSOR FOR CONCRETE PILE TESTING AND MONITORING<br>Constanze Schilder, Harald Kohlhoff, Detlef Hofmann, Wolfgang R. Habel |
| 11:10 - 11:30 | Topic 4.3<br>THE RESEARCH OF THE PLATFORM FOR BRIDGE VISUAL INSPECTION BASED ON QUADROTOR AIRCRAFT<br>Shuri Cai, Jian Su, Wanheng Li, Xiaojing Wang, Jing Liu, Mohai Yuan |

# Room 3 / Thursday, December 15

**Session 24: Field Applications**
Chair: Urs Meier
Co-chair: Gerardo Aguilar

| | |
|---|---|
| 9:30 - 9:50 | Topic 7.1<br>LONG-TERM BEHAVIOR WITH SHM ON CARBON FIBER REINFORCED POLYMERS<br>Urs Meier |
| 9:50 - 10:10 | Topic 7.1<br>MONITORING OF A PILING WALL BY MEANS OF FBG: PART 2<br>Dario Rinaldis, Paolo Clemente, Michele Caponero, Giuseppe Rossi |
| 10:10 - 10:30 | Topic 7.1<br>AN INTEGRATED MONITORING SYSTEM FOR MODULAR BUILDINGS<br>Amar Seeam, Tianxin Zheng, David Laurenson, Yong Lu, Asif Usmani |
| 10:30 - 10:50 | Topic 7.1<br>ENVIRONMENTAL EFFECTS ON LONG-TERM BEHAVIOURSOF TAMAR SUSPENSION BRIDGE<br>Robert Westgate, Ki-Young Koo, Elizabeth Cross, James M. W. Brownjohn |
| 10:50 - 11:10 | Topic 6.2<br>DEVELOPMENT OF A CABLE DAMPER - A TAILOR-MADE DESIGN APPROACH FOR STAY CABLES<br>Peter Furtner, Markus Heim |

# Poster Presentations

Papers selected by their authors for Poster Presentation are being displayed in a section of the Technical and Commercial Exhibit. They are the following:

**Topic 1.5**
FATIGUE SENSOR FOR STRUCTURAL HEALTH MONITORING
Mikhail Karuskevich, Tatiana Maslak, Gulzar Seidametova

**Topic 4.2**
DAMAGE EVALUATION OF CONCRETE BEAM UNDER DYNAMIC LOADING BASED ON PIEZOELECTRIC TRANSDUCER
Linsheng Huo, Xu Li, Hongnan Li

**Topic 4.3**
DESIGN AND CONFIGURATION OF A LARGE SCALE BRIDGE MONITORING SYSTEM FOR LONG TERM EVALUATION
José Alfredo López-López, Bernardo Hernández-Sánchez, Juan Antonio Quintana-Rodríguez, Francisco Javier Carrión-Viramontes, José-Luis Moreno-Jiménez

**Topic 4.3**
APPLICATION OF TIME SERIES ANALYSIS FOR BRIDGE MONITORING
Gerardo Rodríguez Gutiérrez, Roberto Gómez-Martínez, David Murià-Vila, Joel Mauricio Cortés Patiño, Marco Antonio Mendoza Salas, Abraham Roberto Sánchez Ramírez, Miguel Ángel Mendoza García

**Topic 4.6**
IMPLEMENTATION OF CAMCORDERS TO MEASURE DISPLACEMENTS IN STRUCTURES
Carlos H. Huerta-Carpizo, David Murià-Vila

**Topic 5.2**
THE APPLICATION OF RADAR IN DETECTING PRESTRESSED STEEL REINFORCEMENT
Jing Liu, Xiaoyu He

**Topic 5.5**
A BAYES-BASED UPDATING MODEL OF TRAFFIC LOADS: APPLICATION TO NANJING 3<SUP>RD</SUP> YANGTZE RIVER BRIDGE
Yiming Gu, Shunlong Li, Hui Li

# Social Program

The following social events were arranged for and are included in the registration fees of both technical participants and accompanying persons:

**Sunday, Dec 11**
18:00 - 20:00 Welcome Reception

**Monday, Dec 12**
08:30 - 9:00 Opening Ceremony

**Tuesday, Dec 13**
12:00 - 18:00 Tour to Tulum, Conference Dinner and show in Xcaret

**Thursday, Dec 15**
12:00 - 12:30 Closing Ceremony

# Venue Information

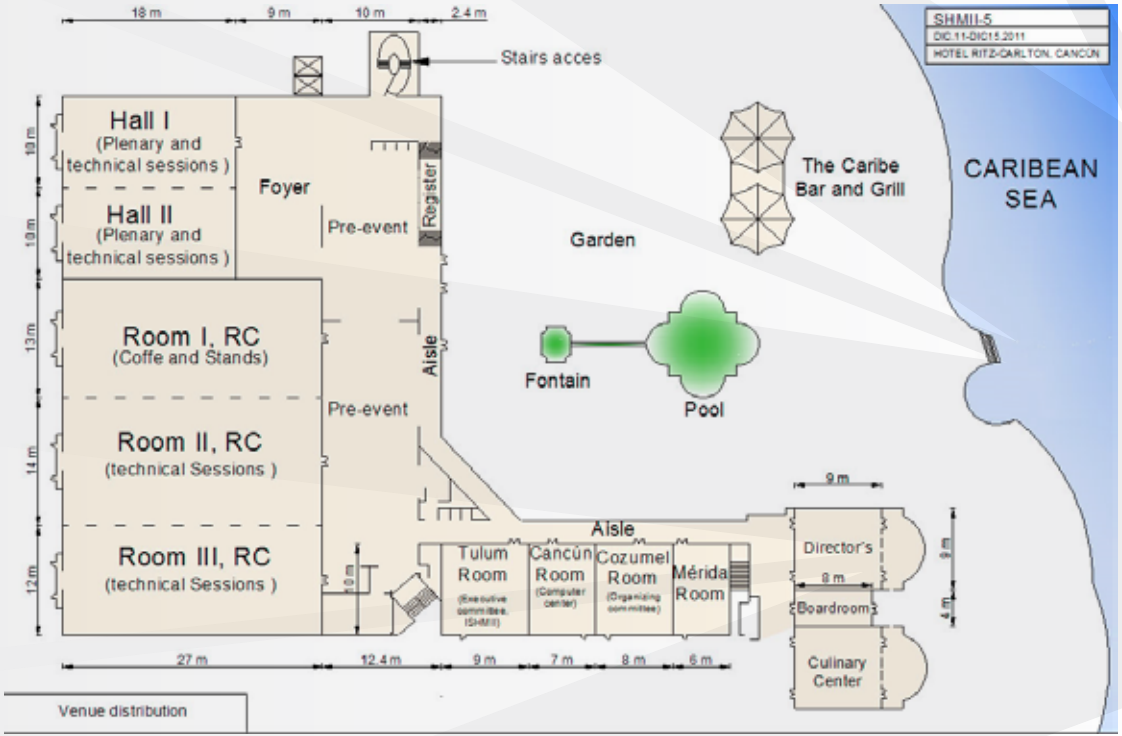
Cancún is a worldwide-known destination because of its beautiful beaches, excellent hotels and exiting nightlife. Cancún offers water sports of all kinds, and it is famous for the fantastic Caribbean Sea color and its marine life. Winter weather is perfect for outdoor activities with only scattered night rains and temperature ranging from 20 to 31°C (68-87°F).

The SHMII-5 is being held at The Ritz-Carlton, Cancún. At the Ritz-Carlton, a spirit of elegance and enchantment prevails. Explore an underwater dreamland, marvel at nearby Mayan sites or simply relax on the exceptional resort's white-sand beachfront. Just minutes from many lively and leisurely attractions, the Ritz-Carlton luxury hotel features 365 guestrooms overlooking the sea, a full-service spa, an impressive culinary center, award-winning restaurants and a stunning beach club featuring the largest beach in Cancun.

The address of the hotel is:
**THE RITZ-CARLTON, CANCUN**
Retorno del Rey #36, Zona Hotelera,
Cancun, Quintana Roo 77500 Mexico Phone: 52 998 881 0808

# The Ritz-Carlton Hotel Conference Space

THE RITZ-CARLTON®




Venue distribution

# Exhibitors


Kinemetrics


NATIONAL
INSTRUMENTS


sigmetric


Redondo Optics, Inc.


mageba
Switzerland
www.mageba.ch


ROCTEST
TELEMAC
SMARTEC


MEXPRESA


engenia
Ingenuity in sensing solutions


MICRON
OPTICS


Technica SA


CMS
Chandler Monitoring Systems Inc.


OZ OPTICS LIMITED
OZ Optics
www.ozoptics.com


Queen's University
Belfast


EURORVA


Mónitron


PEMEX
EXPLORACION Y PRODUCCION


SCT
SECRETARÍA DE
COMUNICACIONES
Y TRANSPORTES


imt


INSTITUTO
DE INGENIERÍA
UNAM


CFE
Comisión Federal de Electricidad


# 5th

DECEMBER 11-15

# INTERNATIONAL CONFERENCE ON STRUCTURAL HEALTH MONITORING OF INTELLIGENT INFRASTRUCTURE

CANCÚN MÉXICO 2011

INSTITUTO DE INGENIERÍA UNAM

imt

SCT
SECRETARÍA DE COMUNICACIONES Y TRANSPORTES