CONFERENCE PROGRAM

EVACES 2023

10TH International Conference of Experimental Vibration Analysis for Civil Engineering Structures

Politecnico di Milano, Italy

August 30 – September 1, 2023

www.evaces2023.polimi.it

EVACES 2023

10TH INTERNATIONAL CONFERENCE ON
EXPERIMENTAL VIBRATION ANALYSIS
FOR CIVIL ENGINEERING STRUCTURES
MILAN, ITALY

POLITECNICO
MILANO 1863

Table of content

WELCOME MESSAGE

It is with great pleasure that we welcome you to the 10th edition of the International Conference on Experimental Vibration Analysis for Civil Engineering Structures (EVACES).

Experimental vibration analysis has become increasingly important over the past 20 years since the first edition of EVACES was organized in Bordeaux in 2005. The following six editions took place in person in Porto, Portugal (2007), Wroclaw, Poland (2009), Varenna, Italy (2011), Ouro Preto, Brazil (2013), Dübendorf, Switzerland (2015), San Diego, United States of America (2017), and Nanjing, China (2019). Despite the difficulties connected with the pandemic, the 2021 EVACES edition was successfully organized online by the University of Tokyo and Saitama University in Japan (2021).

Since its first edition in 2005, EVACES is a major event, where experts from all over the world present and discuss recent scientific developments and successful applications in the field of experimental vibration analysis for civil structures. Consistently with the research trends and interests, the focus of the conference broadened over the years to include topics related to digitalization, machine learning techniques, and informed decision support tools. Several Special Sessions were organized in this edition to address traditional and emerging topics and technologies, theoretical developments, and real-world applications. Sessions focused on vibration-based monitoring and damage detection in bridges, railways, dams, stadia, and cultural heritage buildings. New topics gained attention, like seismic monitoring, human-induced vibrations, model-based and data-driven methods for system identification, indirect monitoring, use of robotic systems and innovative sensing systems to make data collection a smoother task.

The conference is now a well-established premier venue for the dissemination of the most recent scientific and technological advances in the field, including theoretical and experimental investigations, and technology development. This was clearly demonstrated by the considerable growth in the number of papers and participants in the current 2023 edition which has seen more than 200 registered participants.

EVACES 2023 has been hosted by Politecnico di Milano, the main technical University in Italy, located at the heart of one of the most industrialized areas all over Europe, a bridge between Italy and the world for research, industry and also for the cultural and historical background, which have created a unique framework to the event.

Prof. Maria Pina Limongelli

ORGANIZERS

Maria Pina Limongelli, Chair
Politecnico di Milano, Department of Architecture, Built Environment and Construction Engineering (DABC), Milan, Italy

Carmelo Gentile, Co-chair
Politecnico di Milano, Department of Architecture, Built Environment and Construction Engineering (DABC), Milan, Italy

Marco Belloli, Co-chair
Politecnico di Milano, Department of Mechanical Engineering (DMEC), Milan, Italy

Alfredo Cigada, Co-chair
Politecnico di Milano, Department of Mechanical Engineering (DMEC), Milan, Italy

Scientific Committee Members

Ahmet E. Aktan. Drexel University, USA

Rodrigo Astroza. Universidad de los Andes, Chile

Flavio Barbosa. Federal University of Juiz de Fora, Brazil

Jan Bien. Wroclaw University of Science and Technology, Poland

Elsa Caetano. University of Porto, Portugal

Joel P. Conte. University of California San Diego, USA

Christian Cremona. Bouygues Construction, France

Alvaro Cunha. University of Porto, Portugal

Alexandre A. Cury. University of Juiz de Fora, Brazil

Ji Dang. Saitama University, Japan

Guido De Roeck. KU Leuven, Belgium

Glauco Feltrin. EMPA, Switzerland

Carmelo Gentile. Politecnico di Milano, Italy

Paweł Hawryszków. Wroclaw University of Science and Technology, Poland

Raid Karoumi. KTH Royal Institute of Technology, Sweden

Mieszko Kużawa. Wroclaw University of Science and Technology, Poland

Maria Pina Limongelli. Politecnico di Milano, Italy

Luca Martinelli. Politecnico di Milano, Italy

Antonino Morassi. University of Udine, Italy

Tomonori Nagayama. The University of Tokyo, Japan

Zhishen Wu. Ibaraki University, Japan

Jian Zhang. Southeast University, China

Scientific secretariat

Pier Francesco Giordano
Politecnico di Milano, Department of Architecture, Built Environment and Construction Engineering (DABC), Milan, Italy

Said Quqa
University of Bologna, Department of Civil, Chemical, Environmental, and Materials Engineering (DICAM), Bologna, Italy

Organization secretariat

Giancarlo Costa
Politecnico di Milano, Department of Architecture, Built Environment and Construction Engineering (DABC), Milan, Italy; BAM Federal Institute for research and testing, Berlin, Germany

Local organizers

STRUCTURAL PERFORMANCE MODELING MANAGEMENT MONITORING | SPM³ RESEARCH GROUP

Fondazione Politecnico di Milano

Othmane Lasri. Politecnico di Milano

Michele Bolognini. Politecnico di Milano

Zehra Irem Turksezer. Politecnico di Milano

Nilgün Merve Çağlar. Politecnico di Milano

Xi Liu. Dalian University of Technology

Saman Jamshidi. Politecnico di Milano

Marianna Alcini, Fondazione Politecnico di Milano

Federica Auteri, Fondazione Politecnico di Milano

Mara Tumiati, Fondazione Politecnico di Milano

CONFERENCE INFORMATION

Venue

POLITECNICO DI MILANO, Leonardo Campus

Main entrance: Piazza Leonardo da Vinci, 32, 20133 Milano (MI), Italy

Trifoglio (Building 13): Via Edoardo Bonardi, 9, 20133 Milano (MI), Italy

Registration

The Registration Desk will be located on the Ground Floor of the Trifoglio (Building 13).

Registration Desk opening hours:
Tuesday, August 29: 16:00 – 20:00
Wednesday, August 30: 8:00 – 17:30
Thursday, August 31: 8:30 – 17:30
Friday, September 1: 8:30 – 15:30

During the opening hours, all regularly registered participants can collect the badge and the conference material. Our staff will be pleased to help you with all your enquiries.

The participants are kindly requested to wear the Symposium badge at all times during the Symposium.

On site registration

On-site registration will be available throughout EVACES 2023, during the operational hours of the registration desk. Registration fees and dates are reported below. Only electronic methods are accepted for on-site payments.

Registration type	Price
Full registration	800 €
Student registration	600 €
One day registration	600 €
One day registration & Social Event*	700 €
Companion registration	350 €
Social event August 31 extra ticket	100 €

Extra tickets for the Gala Dinner are subject to availability. Please check at the registration desk.

Slide center & presentation guidelines

The slide center is situated on the ground floor of the Trifoglio Building, and its operating hours are from 8:00 to 17:00 daily.

To ensure smooth proceedings, speakers are kindly requested to send their presentations to evaces2023-sec@polimi.it at least 24 hours before their scheduled presentation time. It's important to note that the use of personal laptops for presenting and/or uploading slides right before the presentation is not permitted.

Speakers have the opportunity to review and check their slides in the slide center until 30 minutes prior to the commencement of the special session. This provision aims to facilitate a well-prepared and organized presentation experience.

Awards

During EVACES 2023, we will be acknowledging exceptional research contributions through the presentation of the "Best Paper of EVACES 2023" awards. Two exceptional papers will be selected for this prestigious honor, reflecting their outstanding quality and significance within the conference's themes. The-winning papers' titles and the announcement of their accomplished authors will take place at the aperitif event held at Sforza's Castle.

Certificate of attendance

Certificate of Attendance can be acquired by sending an email to: evaces2023-sec@polimi.it.

Proceedings

All the accepted papers (after peer review) will be published in the Springer proceedings of EVACES 2023 and Indexed by SCOPUS. The proceedings can be downloaded for a limited period from the conference website: https://www.evaces2023.polimi.it/

Wi-Fi access

How to access the network:

1. Connect to the "polimi" open wireless network or plug a cable into an active socket
2. Open a browser window and navigate to any web page (not https)
3. You will be redirected to the access page: select "Login as a guest" from the list of available authentication methods and enter the credentials below

   Login: e248108

   Password: RNPMB7U2

For further information and terms of use: http://www.connectandgo.polimi.it/en

Accessibility for individuals with disabilities

The entire venue has been designed to ensure accessibility for individuals with disabilities. If you require assistance or have any inquiries, kindly visit the Registration Desk or send an email to evaces2023-sec@polimi.it.

Lunches and coffee breaks

Refreshments and meals are served at the designated Catering Areas within the venue, as indicated in the technical program. Access to these areas is granted exclusively to individuals wearing their provided badge.

Dietary requirements and allergies

Should you have any inquiries or concerns about the food provided during the conference, please do not hesitate to reach out to the staff at the Registration Desk.

Security of personal belongings

Please refrain from leaving personal belongings unattended in meeting rooms or public spaces. Unattended items may be removed by security personnel. Please note that the EVACES 2023 Organization cannot be held responsible for items left unattended.

Lost items

Found items will be held at the Registration Desk until the conclusion of the event.

TRANSPORTATION

Getting to Milan

AIRPORTS. Milano is served by three airports: Milano Linate (about 7 km far from the city centre), Milano Malpensa (about 45 km) and Bergamo Orio al Serio (about 50 km). Milano can be easily reached from airports thanks to special bus and railway services. The Milano Linate airport has recently been connected to the metro system, specifically the blue line (M5).

RAILWAYS. Milano is served by both "Ferrovie dello Stato" and "Ferrovie Nord". On the following websites you can check destinations, fares and timetables:

www.trenitalia.it

www.trenord.it (Ferrovie Nord)

The most important railway stations in Milano are:

Milano Centrale. It's the main railway station, with international and high-speed train departures. There are several buses connection to the airports with departure and arrival to the east side of the Station. It is located in Piazzale Duca d'Aosta, and you can easily reach it by metro (green line – M2; or yellow line – M3).

Porta Garibaldi. Mostly with regional departures and used by commuters. The "Passante Ferroviario" connects the station to "Bovisa Nord" Station and "Porta Vittoria" Station. It is located in Piazza Sigmund Freud and you can reach it by metro (green line – M2).

Milano Lambrate. This is an intermediary station, used both for regional and national departures. It is located in piazzale Bottini and you can reach it by metro (green line – M2)

Milano Cadorna. It is mainly a commuter station, located in Piazzale Luigi Cadorna. From this station you can take the train "Malpensa Express" to the airport of Malpensa, with departure every 35 minutes. You can reach the station by metro (green line – M2).

Public transports in Milan

BUSES, TRAMS AND METRO

Milano's main public transportation system is run by ATM (Azienda Trasporti Milanesi). It consists of buses, trams and an underground metro system. Visit www.atm-mi.it for detailed information on public transports in Milan and to create personalized itineraries.

An urban network ticket costs €2.20 and is valid for 90 minutes on all lines included in the urban network of Milano. Within these 90 minutes, you can take multiple trips on surface transportation as well as on the metro by entering, exiting, and re-entering through the turnstiles. Other types of ticket are available (for instance 10 trip tickets).

Urban tickets are priced at a flat rate. Extra-urban and cumulative tickets are priced progressively depending on the distance travelled between the departure point and the final destination.

To skip ticket queues, you can use your contactless bank card to travel on metro and surface lines. No extra costs will be applied. Please note: contactless payment is only accepted on ATM transport services.

TAXI

To secure a taxi in Milan, you should head to the nearest designated taxi stand or, alternatively, make a pre-arranged booking by calling ahead. Milan boasts numerous Radio Taxi companies, providing various options for reserving a taxi through a range of online and phone platforms. Some of the Radio Taxi services you can use for reservation include the following contact numbers: +39 02 4040 | +39 02 8585 | +39 02 6969.

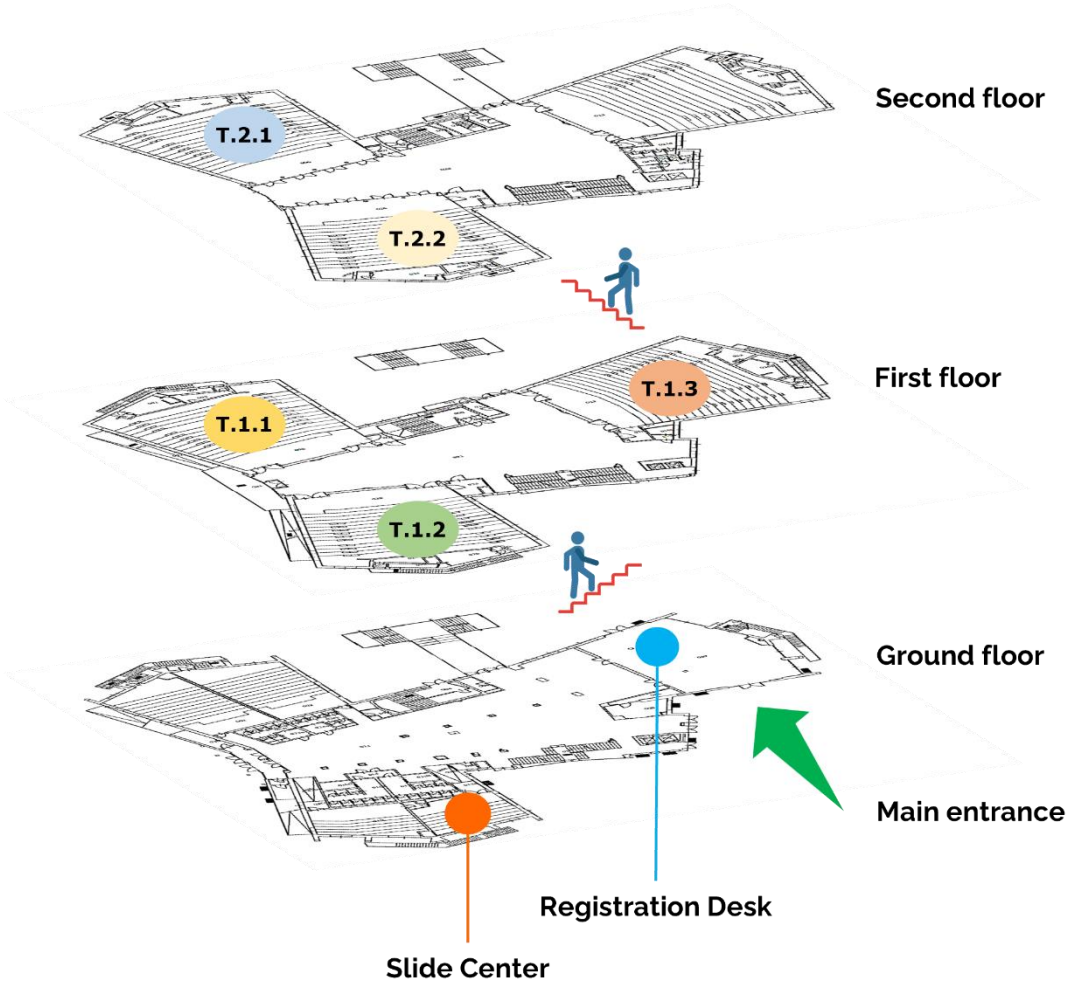
Getting to Politecnico di Milano

The venue for EVACES 2023 is situated at the Leonardo Campus of Politecnico di Milano. It is conveniently accessible from both Centrale Railway Station and Cadorna Railway Station via taxi or public transportation: you can either take the green metro line (M2) to PIOLA station, trams 19 or 33, or alternatively, buses 62, 91, and 93.
You can find the main entrance of the Leonardo Campus at Piazza Leonardo da Vinci 32, which is only a short 5-minute walk away from the Piola station. EVACES 2023 will take place within the facilities of the Trifoglio building (Building 13), which is located in Via Edoardo Bonardi 9.

VENUE

EVACES 2023 will be held in the Building 13 of the Leonardo Campus of Politecnico di Milano, which is commonly known as the "Trifoglio" (Clover, ☘). Initially envisioned by Gio Ponti, this building has undergone a considerate revitalization process under the guidance of Renzo Piano. The Trifoglio will serve as our main hub, encompassing Plenary Sessions, Parallel Sessions, an Exhibition Area, and providing designated areas for Coffee Breaks and lunches.

Getting to Politecnico di Milano is incredibly convenient. You can easily access it by taking the green metro to PIOLA station. Additionally, the campus can be reached using trams 19 or 33, as well as buses 62, 91, or 93. The primary entrance to the Trifoglio is positioned at the walkway's terminus from the Campus entrance on Via Bonardi 9. Additionally, you can reach the Trifoglio by crossing the School of Architecture (Building 11) on Via Ampere or using the underpass that links the historic campus in Piazza Leonardo da Vinci to the Architecture Campus.



The conference sessions are scheduled for rooms T1.1, T1.2, and T1.3 on the first floor of the Trifoglio building, as well as rooms T2.1 and T2.2 on the second floor. Sponsor booths will be strategically placed in the halls on both the first and second floors. Additionally, the halls on both floors will be designated for coffee breaks and lunches.

KEYNOTE SPEAKERS

Elsa Caetano

Elsa Caetano received her PhD in Civil Engineering in 2001, from the Univ. of Porto and the Habilitation in 2011. She is presently Full Professor at the Department of Civil Engineering of this University. Elsa Caetano has a background in Experimental Structural Dynamics and her research and consultancy has focused on the dynamics of bridges and special structures. Particular topics of her research are Cable Dynamics, Pedestrian and Wind Induced Vibrations, Passive Control Systems and Structural Health Monitoring.

Helmut Wenzel

Helmut Wenzel currently operates the consulting firm Wenzel Consult in Austria. The scope currently covers mainly large bridges worldwide that deserve special attention. Current focus is on bridges in Turkey, a damaged bridge in Costa Rica and a number of large projects in India. He previously managed VCE in Vienna where SHM technologies have been developed and brought into practice. He was the coordinator of the major research projects IRIS and SAMCO of the European Commission. Several research results finally have been introduced to EUROCODES and ISO.

Anne S. Kiremidjian

Anne Kiremidjian is the C. L. Peck, Class of 1906 Professor in the School of Engineering at Stanford University where she teaches and conducts research on earthquake hazard, risk, and resilience modeling, and structural health monitoring for extreme events. She was the director of the John. A. Blume Earthquake Engineering Center at Stanford and has served on numerous committees and boards at Stanford, various university consortia and national and international organizations. She was a co-founder of two technology companies – K2 Technologies, Inc. and Sensametrics, Inc. Prof. Kiremidjian She has received several prestigious awards such as the John Fritz Medal from the American Association of Engineering Societies.

Keith Worden

Professor Worden began academic life as a theoretical physicist, with a degree from York University and a PhD in Mechanical Engineering from Heriot-Watt University eventually followed. A period of research at Manchester University led to an appointment at the University of Sheffield in 1995, where he has happily remained since. Keith's research is concerned with applications of advanced signal processing and machine learning methods to structural dynamics. He has particular interests in structural health monitoring and nonlinear system identification.

Antonina Pirrotta

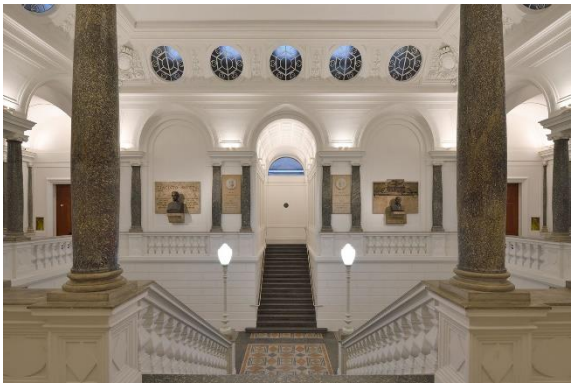
Antonina Pirrotta is a Full Professor in Structural Mechanics at the University of Palermo, Italy, with expertise in passive control, multi-body systems, continuum mechanics, stochastic mechanics, and health monitoring. She has received prestigious awards and fellowships, including the First Easd Senior Research Prize and the Research Prize "Francesco Carbone Experimenta." Prof. Pirrotta is actively involved in scientific associations and committees and has delivered invited lectures at international conferences. She serves on editorial boards of esteemed journals like Meccanica, Journal of Engineering Mechanics (ASCE).

SOCIAL PROGRAM

August 29

Welcome cocktail

Before the official start of EVACES 2023, a Welcome Cocktail will take place within the elegant and distinguished ambiance of the Politecnico di Milano's Rectorate, an architectural masterpiece that perfectly marries tradition and innovation.
Also, we invite all conference participants to conveniently complete their registration for EVACES 2023. Starting from 16:00, our dedicated registration desk will open its doors to warmly welcome you at the entrance of the Trifoglio (Building 13). Our registration team will be on hand to assist you with any inquiries, facilitate the registration process, and provide you with all the necessary materials for your enriching conference experience.
We look forward to raising our glasses and toasting to the success of EVACES 2023!



Where: Politecnico di Milano, Rectorate - Building 1 (ground floor), Piazza Leonardo da Vinci, 32 - 20133 – Milan, Italy. Arriving is simple: take the green metro to PIOLA station, or consider trams 19 or 33, or buses 62, 91, or 93.

When: August 29, from 17:30 to 20:00.

August 30

Light dinner at the Sforza's Castle

Get ready for an enchanting evening as EVACES 2023 presents its second social event—an exquisite Aperitif in the captivating Corte Ducale and Sala Viscontea within Milan's iconic Sforza's Castle. Not only is it one of Europe's largest castles, but it also stands as a prominent symbol of Milan and its rich history. The grandeur of this historic venue sets the stage for a truly unforgettable gathering.
This historical gem, erected in the 15th century by Francesco Sforza stands upon the remnants of the medieval fortification known as the Castello di Porta Giovia. Adding to its historical layers, the location once occupied by Castello di Porta Giovia was home to the Castrum Portae Jovis during the Roman era—an integral defensive structure of ancient Milan. Transformed and reshaped over the centuries, the Sforza's Castel was an important military citadel during the 16th and 17th centuries. Restored in a historicist style by Luca Beltrami between 1890 and 1905, the castle now serves as a hub for cultural institutions and houses important museums.

During the aperitif, we will have the privilege to embark on a journey through art and history with our private visit to the Pietà Rondanini — a masterpiece by Michelangelo Buonarroti located in a dedicated room of the Sforza's Castel. This remarkable sculpture represents the final chapter of the artist's legacy. During this exclusive encounter, we will delve into the sculpture's cultural significance and explore the innovative vibration and seismic protective system implemented to protect the Pietà.

Where: Castello Sforzesco, Piazza Castello, 20121 Milan, Italy. Easily access Castello Sforzesco, situated in Milan's heart, by using public transport. Choose the red line (M1) to Cairoli or Cadorna FN, the green line (M2) to Lanza or Cadorna FN, or take trams 1, 2, 4, 12, 14, or 27. Alternatively, consider buses 50, 57, 58, 61, or 94 for seamless access to this iconic landmark.

When: August 30, from 19:30 to 23.30.

August 31

Gala dinner at Villa torretta

Prepare for an unforgettable evening as EVACES 2023 culminates in the grand finale—the Gala Dinner set within the historic walls of the Grand Hotel Villa Torretta.
A true treasure of the 16th century, Villa Torretta stands as a testament to bygone eras and timeless elegance. Originally envisioned as a villa of delight, Villa Torretta has passed through the hands of various illustrious owners from noble Milanese families across the centuries. Following meticulous restoration work from 1997 to 2002, the villa has been elevated to its current stature—a prestigious hotel that seamlessly blends history and luxury.
As the gala evening unfolds, we will commence with a cocktail party set amidst the lush gardens of Villa Torretta. The Gala Dinner will be hosted within the villa's resplendent halls. As the evening progresses, the celebrations continue with a dynamic DJ set.

Where: Via Milanese, 3, 20099 Sesto San Giovanni, Italy. Villa Torretta is easily accessible via the Lilac Line of the metro (M5), which operates until midnight. The nearby Bignami metro stop is just 700 meters away, ensuring convenient access to the venue.

When: August 31, from 19:00 to 23.30.

SPECIAL SESSIONS

SS01 Vibration-based structural health monitoring for railway infrastructure

Eleni Chatzi
ETH Zürich, Switzerland

Alfredo Cigada
Politecnico di Milano, Italy

Kostantinos Tatsis
ETH Zürich, Switzerland

Charikleia Stoura
ETH Zürich, Switzerland

SS02 The role of traffic in bridge condition monitoring

Said Quqa
University of Bologna, Italy

Eleonora Maria Tronci
Columbia University, USA

Raimondo Betti
Colombia University, USA

SS03 Recent advancements in vehicle-bridge interaction problems

Angelo Aloisio
University of L' Aquila, Italy

Rocco Alaggio
University of L' Aquila, Italy

SS04 Challenges in SHM development: deterioration assessment and value of information

Pier Francesco Giordano
Politecnico di Milano, Italy

Maria Pina Limongelli
Politecnico di Milano, Italy

Sebastian Thöns
Lund University, Sweden

SS05 Human-induced vibrations

Vitomir Racic
University of Belgrade, Serbia

Maria Gabriella Mulas
Politecnico di Milano, Italy

SS06 Real-world applications of OMA-based testing and monitoring

Sérgio Pereira
University of Porto, Portugal

Álvaro Cunha
University of Porto, Portugal

SS07 System identification for infrastructure components subject to deterioration

Leandro Iannacone
University College London, UK

Paolo Gardoni
University of Illinois Urbana-Champaign, USA

SS08 Uncertainties in system identification and damage diagnosis

Szymon Greś
ETH Zürich, Switzerland

Kostantinos Tatsis
ETH Zürich, Switzerland

Michael Döhler
Inria, Rennes, France

Eleni Chatzi
ETH Zürich, Switzerland

SS09 Vibration analysis on large dams. Seismic and structural health monitoring

Sérgio Oliveira
National Laboratory for Civil Engineering, Portugal

André Alegre
Instituto Politécnico de Lisboa, Portugal

SS10 Machine learning and data-driven methods for structural dynamics

Tomonori Nagayama
University of Tokyo, Japan

Ji Dang
Saitama University, Japan

SS11 Structural health monitoring and non-destructive testing for architectural and cultural heritage

Rosario Ceravolo
Politecnico di Torino, Italy

Marco Civera
Politecnico di Torino, Italy

Erica Lenticchia
Politecnico di Torino, Italy

Gaetano Miraglia
Politecnico di Torino, Italy

SS13 Structural health monitoring of buildings in seismic-prone areas

Nilgün Merve Çağlar
Politecnico di Milano,

Erdal Şafak
Boğaziçi University, Turkey

Eser Çaktı
Boğaziçi University, Turkey

SS14 Dynamic identification and vibration-based structural health monitoring of historical and modern towers

Carlo Rainieri
National Research Council of Italy, Italy

Carmelo Gentile
Politecnico di Milano, Italy

SS15 Machine learning for damage identification under operational and environmental effects

Eloi Figueiredo
Lusófona University, Portugal

Ionut Moldovan
Lusófona University, Portugal

Jyrki Kullaa
Metropolia University of Applied Sciences, Finland

Marek Salamak
Silesian University of Technology, Poland

SS16 Slender structures: dynamics and vibration based monitoring techniques

Marta Berardengo
University of Genoa, Italy

Stefano Manzoni
Politecnico di Milano, Italy

Marcello Vanali
University of Parma, Italy

Francescantonio Lucà
Politecnico di Milano, Italy

SS17 Vibration-based health monitoring of offshore structures

Luke J Prendergast
University of Nottingham, UK

Abdollah Malekjafarian
University College Dublin, Ireland

SS18 Vibration-based assessment and monitoring of bridges

Carmelo Gentile
Politecnico di Milano, Italy

Walter Salvatore
University of Pisa, Italy

Filippo Ubertini
University of Perugia, Italy

SS19 Indirect methods for monitoring of transport infrastructure

Emrah Erduran
Oslo Metropolitan University, Norway

Semih Gonen
Oslo Metropolitan University, Norway

SS20 Indirect monitoring of civil infrastructure using moving vehicles

Abdollah Malekjafarian
University College Dublin, Ireland

Eugene O'Brien
University College Dublin, Ireland

Chul-Woo Kim
Kyoto University, Japan

YB Yang
Chongqing University, China

Hae Young Yang
Stanford University, USA

SS21 Unmanned vehicles, robotics, and 3D vision technologies in civil engineering for inspection automation and system resilience

Zhiqiang Chen
University of Missouri Kansas City, USA

Ji Dang
Saitama University, Japan

Yasutaka Narazaki
Zhejiang University, China

SS22 Industrial advanced applications of vibration-based monitoring

Giulio Telleschi
IDS GeoRadar, Italy

Necati Catbas
University of Central Florida, USA

Carlo Rainieri
National Research Council of Italy, Italy

Maria Pina Limongelli
Politecnico di Milano, Italy

Derek Skolnik
Kinemetrics, USA

SS24 Fiber optic and innovative sensors for monitoring existing structures and infrastructures

Alessandro Cardoni
Politecnico di Torino, Italy

Daniele Inaudi
SMARTEC SA, Switzerland

Gian Paolo Cimellaro
Politecnico di Torino, Italy

SS25 Vibrations in timber structures: a focus on experiments, damage detection techniques, numerical models, open issues

Chiara Bedon
University of Trieste, Italy

Maria Pina Limongelli
Politecnico di Milano, Italy

TECHNICAL PROGRAM

<table>
<tr><th></th><th>August 29</th><th>August 30</th><th>August 31</th><th>September 1</th></tr>
<tr><td>8:00 – 9:00</td><td rowspan="11"></td><td>Registration</td><td></td><td></td></tr>
<tr><td>8:30 – 9:00</td><td>Opening ceremony</td><td>Registration</td><td>Registration</td></tr>
<tr><td>9:00-10:00</td><td>Keynote: Prof. Caetano</td><td>Keynote: Prof. Kiremidjian</td><td>Keynote: Prof. Worden</td></tr>
<tr><td>10:00-11:00</td><td>Parallel Sessions</td><td>Parallel Sessions</td><td>Parallel Sessions</td></tr>
<tr><td>11:00-11:30</td><td>Coffee break</td><td>Coffee break</td><td>Coffee break</td></tr>
<tr><td>11:30-12:30</td><td>Parallel Sessions</td><td>Parallel Sessions</td><td>Parallel Sessions</td></tr>
<tr><td>12:30-14:00</td><td>Lunch</td><td>Lunch</td><td>Lunch</td></tr>
<tr><td>14:00-15:00</td><td>Keynote: Prof. Wenzel</td><td rowspan="3">Industrial plenary presentations</td><td>Keynote: Prof. Pirrotta</td></tr>
<tr><td>15:00-15:30</td><td rowspan="2">Parallel Sessions</td><td>Closing ceremony</td></tr>
<tr><td>15:30-16:00</td><td rowspan="3">Technical visits</td></tr>
<tr><td>16:00-16:30</td><td rowspan="2">Pre-registration</td><td>Coffee break</td><td>Coffee break</td></tr>
<tr><td>16:30-17:30</td><td>Parallel Sessions</td><td>Parallel Sessions</td></tr>
<tr><td></td><td>Welcome cocktail at PoliMI Rectorate</td><td>Aperitif at the Sforza's Castle</td><td>Gala dinner at Villa Torretta</td><td></td></tr>
</table>

August 29

	HALL OF THE RECTORATE
16:00-17:30	Participant registration
17:30-20:00	Welcome cocktail

August 30

Keynotes

Elsa Caetano

Characterisation of the Force and Integrity of Tensioned Members

The flexibility of cable structures, combined with the typical low damping, results in a significant proneness to vibrations induced by environmental and operational loads, which may lead to accelerated deterioration and the early need to replace cables and tensioned members. Although monitoring such structures has been implemented more frequently in the last decades, cables and tensioned members have been scarcely instrumented, and monitoring their behaviour is often outside the scope of installed monitoring systems. This is a consequence of the difficulty in obtaining information on the condition of members that exist in a high number (stay cables and hangers) from a necessarily limited number of sensors, and it is also due to the actual difficulty in extracting relevant information regarding the cable condition from existing assessment techniques. This lecture discusses the potential of existing instrumentation and monitoring techniques in assessing the installed force and integrity of cables and tensioned beams. In particular, results from a newly developed method based on the propagation of transverse waves are presented, which relate the identified velocities of wave propagation with the force and cable properties.

Helmut Wenzel

Testing real Structures: What Bridge Performance tells us

Testing large Bridges under operation condition is a valuable source of information when condition assessment is required after events like earthquakes or damages from aging. The keynote covers:
(1) The earthquake in Turkey of February 2023 was recorded by many of the monitoring systems in large bridges. This comprises the Khormuran Bridge (cable stayed bridge with 350m cantilever). The performance of this structure under this extraordinary load showed that carefully designed structures can stand excitations higher than those considered in the design.
(2) Retrofit of Tempisque Bridge in Costa Rica, which was hit by an M 7.6 earthquake. The objectives have been the assessment of the condition of the stay cables and the demonstration of the stability of the entire structure under consideration of lifetime and sustainability.
(3) Bridge monitoring in India. India has a large stock of old bridges that suffer from increased loading and missing preventive maintenance. Several cases are presented where different objectives defined most interesting monitoring applications. System identification and performance assessment has become popular and any of the wide number of new bridge monitoring systems will be installed.
(4) Offshore structures in the fast-growing offshore wind power projects are representing a well-accepted and fast-growing monitoring market. Considerable progress has been made in regulation and practice. A number of cases from different types of structures will be presented in relation to the new German guideline VDI 4551.

8:00-8:30	**Participant registration**				
	Room T.1.3				
8:30-9:00	**Opening ceremony**				
9:00-10:00	**Keynote lecture by Prof. E. Caetano Chairs: Prof. H. Wenzel and Prof. A. Cigada**				
	Room T.1.1	**Room T.1.2**	**Room T.1.3**	**Room T.2.1**	**Room T.2.2**
Chairs	**S. Pereira, Á. Cunha**	**C. Gentile, J. Conte**	**A. Malekjafarian, C.-W. Kim**	**M. Civera, M. A. Zanini**	**M. Berardengo, S. Manzoni, F. Lucà**
Special Session	**SS06 Real world applications of OMA-based testing and monitoring**	**SS18 Vibration-based assessment and monitoring of bridges**	**SS20 Indirect monitoring of civil infrastructure using moving vehicles**	**SS11 Structural health monitoring and non-destructive testing for architectural and cultural heritage**	**SS16 Slender structures: dynamics and vibration based monitoring techniques**
10:00-10:15	OPERATIONAL MODAL ANALYSIS AS A TOOL FOR BRIDGE MODEL UPDATING. APPLICATION TO AN UNCONVENTIONAL CASE STUDY Simone Celati, Agnese Natali, Walter Salvatore, Andrea Meoni, Matteo Castellani, Nicola Cavalagli and Filippo Ubertini	A CONVENIENT TENSION ESTIMATION METHOD FOR LINKED SUSPENDERS BASED ON MULTIPLE VIBRATION MEASUREMENTS Chien-Chou Chen, Wen-Hua Wu and Yen-Chih Peng	USING CONTACT RESIDUAL RESPONSES OF A 3-DOF SCOOTER TO IDENTIFY FIRST FEW FREQUENCIES OF THE FOOTBRIDGE Zhenkun Li, Yifu Lan and Weiwei Lin	MODEL CALIBRATION OF SLENDER MINARETS BASED ON ARTIFICIAL NEURAL NETWORKS Quy Thue Nguyen and Ramazan Livaoğlu	EXPERIMENTAL NONLINEAR DYNAMIC ANALYSIS OF A MACHINE SUPPORTING STRUCTURE Reyolando Brasil
10:15-10:30	ASSESSMENT OF A DAMAGED BRIDGE BASED ON MODAL IDENTIFICATION FROM AMBIENT VIBRATION TESTS Min Xu and Luís Oliveira Santos	FULLY AUTOMATIC CABLE TENSION MONITORING BASED ON VIBRATION MEASUREMENTS WITH DEEP LEARNING TECHNIQUES Wen-Hwa Wu, Chien-Chou Chen, Shang-Li Lin and Gwolong Lai	AUTOMATIC DRIVE-BY BRIDGE DAMAGE DETECTION VIA A CLUSTERING ALGORITHM Yifu Lan, Zhenkun Li and Weiwei Lin	VARIATION OF THE DYNAMIC RESPONSE OF RETROFITTED MASONRY WALLS AT DIFFERENT STAGES OF DAMAGE Claudio Oyarzo-Vera and Joaquin Romero	A HYBRID DAMPER WITH PARTICLE IMPACT DAMPING AND COULOMB FRICTION DESIGNED FOR FREE VIBRATION DAMPING Muhammad Ayaz Akbar and Wai On Wong
10:30-10:45	VALIDATION OF AN AUTOMATED APPROACH FOR THE DEFINITION OF REFERENCE MODAL PROPERTIES ON ONSHORE WIND TURBINES Sérgio Pereira, João Pacheco, Francisco Pimenta, Carlos Moutinho, Álvaro Cunha and Filipe Magalhães	OPTIMIZATION OF SENSOR CONFIGURATIONS FOR COST-EFFICIENT MONITORING OF INFRASTRUCTURE SYSTEMS Maria Giovanna Masciotta, Alberto Barontini, Giuseppe Brando and Paulo Lourenco	A DRIVE-BY BRIDGE DAMAGE LOCALISATION METHOD WITH AN INSTRUMENTED VEHICLE Xuzhao Lu, Limin Sun, Chul-Woo Kim, Kai-Chun Chang and Zhuoran Han	ANALYTICAL RELATION BETWEEN NATURAL FREQUENCY AND SPECTRAL ENTROPY IN INFORMATION THEORY OF SINGLE DEGREE OF FREEDOM SYSTEMS Gaetano Miraglia, Marco Civera, Erica Lenticchia and Rosario Ceravolo	DETECTING REAL DAMAGE IN OPERATING TIE-RODS UNDER UNCONTROLLED ENVIRONMENTAL AND OPERATIONAL CONDITIONS Francescantonio Lucà, Stefano Manzoni and Alfredo Cigada
10:45-11::00	THE ANALYSIS FOR THE ACCELERATION DATA OF VEHICLE RUNNING ON OVER 100 BRIDGES BASED ON SSMA	GAME THEORY- BASED FINITE-ELEMENT MODEL UPDATING OF A CABLE-STAYED FOOTBRIDGE Suzana Ereiz, Ivan Duvnjak, Javier Fernando Jiménez-	A DATA-DRIVEN APPROACH FOR MONITORING RAILWAY TRACKS USING DYNAMIC RESPONSES COLLECTED BY AN IN-SERVICE TRAIN Ramin Ghiasi and Abdollah Malekjafarian	REDESIGN OF STRENGTHENING INTERVENTIONS ON HISTORICAL BUILDINGS. THE CASE STUDY OF AN EARTHQUAKE-DAMAGED BELL TOWER	A NOVEL HYBRID DAMPER FOR MITIGATING SEISMIC RESPONSES OF MASS IRREGULAR BUILDINGS Amiya Pandit and Abdollah Malekjafarian

	Yuta Takahashi, Naoki Kaneko, Ryota Shin and Kyosuke Yamamoto	Alonso and Elsa de Sá Caetano		Linda Scussolini, Valerio Foti, Marco Civera, Rosario Ceravolo and Giuseppe Pistone	
11:00-11:30	**Coffee break**				
	Room T.1.1	**Room T.1.2**	**Room T.1.3**	**Room T.2.1**	**Room T.2.2**
Chairs	**S. Pereira, Á. Cunha**	**C. Gentile, J. Conte**	**A. Malekjafarian, C.-W. Kim**	**M. Civera, M. A. Zanini**	**M. Berardengo, S. Manzoni, F. Lucà**
Special Session	**SS06 Real world applications of OMA-based testing and monitoring**	**SS18 Vibration-based assessment and monitoring of bridges**	**SS20 Indirect monitoring of civil infrastructure using moving vehicles**	**SS11 Structural health monitoring and non-destructive testing for architectural and cultural heritage**	**SS16 Slender structures: dynamics and vibration based monitoring techniques**
11:30-11:45	VIBRATION-BASED MONITORING OF A 5-STORY CROSS-LAMINATED TIMBER (CLT) BUILDING PROTOTYPE Alexander Opazo-Vega, Franco Benedetti and Alan Jara-Cisterna	OPTIMISATION OF BRIDGE DECKS MODAL ANALYSIS David Garcia-Sanchez and Alvaro Gaute	BRIDGE RESPONSE FUSION DRIVE-BY-BRIDGE INSPECTION BY MEANS OF MODEL UPDATES Yukihiro Yano, Soichiro Hasegawa, Chul-Woo Kim and Kai-Chun Chang	AMBIENT VIBRATION STUDY AND LASER SCANNING OF ISLAM KHODJA MINARET IN KHIVA (UZBEKISTAN) FOR FINITE ELEMENT MODELLING Shakhzod Takhirov, Bakhodir Rakhmonov, Ravshanbek Nafasov, Abbos Samandarov, Sevara Sultanova, Mirzokhid Akhmedov, Ravshan Shamansurov and Shukhrat Shamansurov	DAMPING RATIO ESTIMATION FOR A SLENDER MODULAR BUILDING FROM FULL SCALE AMBIENT RESPONSE MONITORING John Hickey, Hollie Moore, Brian Broderick and Breiffni Fitzgerald
11:45-12:00	AN AUTOMATED ALGORITHM FOR EXPERIMENTAL OMA: APPLICATION ON A WARREN TRUSS RAILWAY BRIDGE WITH A PERMANENT MONITORING SYSTEM Antonio Argentino, Lorenzo Bernardini, Lorenzo Benedetti, Gabriele Cazzulani, Claudio Somaschini and Marco Belloli	A SMART SYSTEM BASED ON WIRELESS SENSORS FOR VIBRATION MONITORING OF RAILWAY BRIDGES Federico Zanelli, Nicola Debattisti, Marco Mauri, Francesco Castelli Dezza and Marco Belloli	DRIVE-BY BRIDGE DEFLECTION ESTIMATING METHOD BASED ON TRACK IRREGULARITIES MEASURED ON A TRAIN: EXTENSION TO MULTIPLE BRIDGE SECTIONS Kodai Matsuoka and Hirofumi Tanaka"	ALGORITHMS FOR LARGE-SCALE QUASI-REAL TIME MONITORING OF ARCHITECTURAL AND CULTURAL HERITAGE BASED ON MT-DINSAR DATA Diego Talledo, Andrea Miano, Fabio Di Carlo, Manuela Bonano, Annalisa Mele, Alberto Stella, Riccardo Lanari, Alberto Meda, Andrea Prota and Anna Saetta	INVESTIGATIONS OF MODE SHAPES OF CLOSELY SPACED MODES FROM A LATTICE TOWER IDENTIFIED USING STOCHASTIC SUBSPACE IDENTIFICATION Leon Liesecke, Clemens Jonscher, Tanja Grießmann and Raimund Rolfes
12:00-12:15	AUTOMATED STRUCTURAL MODAL TRACKING OF SUSPENSION BRIDGES SUBJECTED TO OPERATIONAL CHANGES Anno Christian Dederichs, Ole Øiseth and Øyvind W. Petersen	EXPERIMENTALLY VALIDATED TIME-DOMAIN DYNAMIC RESPONSE ANALYSIS OF THE HIGHWAY BRIDGE WITH PERMANENT DEFLECTIONS OF SPANS Mieszko Kużawa, Aleksander Mróz and Jan Bień	ROADWAY ROUGHNESS PROFILE IDENTIFICATION FROM VEHICLE ACCELERATION BY MEANS OF DYNAMIC REGULARIZED LEAST SQUARE MINIMIZATION Soichiro Hasegawa, Chul-Woo Kim and Naoki Kawada	VIBRATION MONITORING AND SEISMIC RESPONSE OF THE MILAN CATHEDRAL Carmelo Gentile, Antonello Ruccolo and Antonella Saisi	LONG-TERM MULTIPLE SENSOR MONITORING OF A HYBRID TOWER WIND TURBINE – LESSONS LEARNED Johannes Rupfle, Bernhard Wondra, Max Botz and Christian Grosse
12:15-12:30	INVESTIGATION OF TRANSMISSIBILITY-BASED OPERATIONAL MODAL ANALYSIS FROM GROUND EXCITATION	THE MONITORING SYSTEM OF THE NEW FILOMENA DELLI CASTELLI CABLE-STAYED BRIDGE Vanni Nicoletti, Lorenzo	DEEP LEARNING-BASED AUTOENCODER FRAMEWORKS WITH THE FEATURES IN THE QUEFRENCY DOMAIN FOR		TRANSMISSIBILITY FUNCTIONS-BASED STRUCTURAL DAMAGE ASSESSMENT WITH THE USE OF EXPLAINABLE

	David Bonilla, Tanja Grießmann and Raimund Rolfes	Amico, Riccardo Martini, Sandro Carbonari and Fabrizio Gara	STRUCTURAL HEALTH MONITORING Lechen Li, Eleonora Maria Tronci, Adrian Brügger and Raimondo Betti		CONVOLUTIONAL NEURAL NETWORKS Marc Parziale, Luca Lomazzi, Marco Giglio and Francesco Cadini
12:30-14:00	**Lunch**				
	Room T.1.3				
14:00-15:00	**Keynote lecture by Prof. H. Wenzel Chairs: Prof. C. Gentile and E. Caetano**				
	Room T.1.1	**Room T.1.2**	**Room T.1.3**	**Room T.2.1**	**Room T.2.2**
Chairs	**S. Pereira, Á. Cunha**	**C. Gentile, R. Ditommaso**	**A. Malekjafarian, C.-W. Kim**	**E. Figueiredo, J. Kullaa**	**C. Rainieri, A. Bilotta**
Special Session	**SS06 Real world applications of OMA-based testing and monitoring**	**SS18 Vibration-based assessment and monitoring of bridges**	**SS20 Indirect monitoring of civil infrastructure using moving vehicles**	**SS15 Machine learning for damage identification under operational and environmental effects**	**SS14 Dynamic identification and vibration-based structural health monitoring of historical and modern towers**
15:00-15:15	BAYESIAN STRUCTURAL MODEL UPDATE WITH TWO-STEP MCMC METHODS ENABLING THE EVALUATION OF THE TAIL SPACE Haruki Yotsui, Kodai Matsuoka and Kiyoyuki Kaito	ESTIMATION OF CABLE FORCES AT THE ASHTON BRIDGE USING AMBIENT VIBRATION TESTING Kaboyamodimo Nare, Pilate Moyo and Bukhosi R. Nyoni	IMPORTANCE OF ELIMINATING OPERATIONAL EFFECTS IN INDIRECT MONITORING OF BRIDGES UNDER REAL-LIFE CONDITIONS Nima Shirzad-Ghaleroudkhani and Mustafa Gül	FINITE ELEMENT MODEL UPDATING OF STEEL BRIDGE STRUCTURE USING VIBRATION-BASED STRUCTURAL HEALTH MONITORING SYSTEM: A CASE STUDY OF RAILWAY STEEL ARCH BRIDGE IN POLAND Duc Cong Nguyen, Marek Salamak, Andrzej Katunin and Grzegorz Poprawa	TOWARDS A CLOUD-BASED PLATFORM FOR STRUCTURAL HEALTH MONITORING: IMPLEMENTATION AND NUMERICAL ISSUES Tiziana Croce, Maria Girardi, Gianmarco Gurioli, Cristina Padovani and Daniele Pellegrini
15:15-15:30	TENSION FORCE ESTIMATION OF POST-TENSIONING EXTERNAL TENDONS THROUGH VIBRATION-BASED MONITORING: EXPERIMENTAL VALIDATION Javier Naranjo-Pérez, Ivan M Diaz, Carlos Martín de la Concha Renedo and Jaime García-Palacios	VIBRATION-BASED STRUCTURAL HEALTH MONITORING OF A HISTORIC ARCH BRIDGE Paolo Borlenghi, Carmelo Gentile and Marco Pirrò	EFFECTS OF ADDED MASS ON INDIRECT STRUCTURAL HEALTH MONITORING OF BRIDGES Richard May, Thomas Reynolds, Hwa Kian Chai, Yong Lu, Robert Corbally and Abdollah Malekjafarian	COMPENSATION OF TEMPERATURE SHIFT IN STRAIN MONITORING DATA VIA AUTO-REGRESSIVE MODELS Ata Kalantari, Stefano Mariani, Antonio Palermo, Gianluca Ascari and Alessandro Marzani	INSIGHT ON THE DYNAMIC IDENTIFICATION OF A REINFORCED CONCRETE BELL TOWER Francesca Marafini, Silvia Monchetti, Giacomo Zini, Federico Gusella, Andrea Giachetti, Michele Betti and Gianni Bartoli
15:30-15:45	FIRST APPLICATIONS AND RESULTS OF THE SHM OF RESIDENTIAL BUILDINGS IN ITALY Vanni Nicoletti, Simone Quarchioni, Sandro Carbonari and Fabrizio Gara	SELF-POWERED SENSORS THROUGH HARVESTER BEAMS: APPLICATION TO WEIGH-IN-MOTION AND DYNAMIC SENSING Hasan Borke Birgin, Enrique García-Macías, Antonella D'Alessandro and Filippo Ubertini	FIELD STUDY OF DRIVE-BY MONITORING FOR ESTIMATING ROAD UNEVENNESS WITH BUSES IN SERVICE OPERATION Ryota Shin, Katsuki Sakuma, Yukihiko Okada and Kyosuke Yamamoto	DAMAGE DETECTION OF STRUCTURES WITH COMPLEX MODES UNDER VARIABLE ENVIRONMENTAL CONDITIONS USING AUTOCOVARIANCE FUNCTIONS Jyrki Kullaa	ON SITE MEASUREMENT OF STRUCTURAL DAMPING OF TALL HYBRID TIMBER-CONCRETE TOWERS Olivier Flamand, Gabriel Giovannelli and Manuel Manthey

15:45-16:00	FIRST RESULTS FROM OPERATIONAL MODAL ANALYSIS OF A FLOATING OFFSHORE WIND TURBINE Francisco Pimenta and Filipe Magalhães	NUMERICAL MODEL CALIBRATION OF A BRIDGE BY USING INVERSE ENGINEERING: A CASE STUDY Felice Carlo Ponzo, Rocco Ditommaso, Gianluca Auletta, Nicla Lamarucciola and Paolo Ielpo		INVESTIGATIONS TOWARDS PHYSICS-INFORMED GAUSSIAN PROCESS REGRESSION FOR THE ESTIMATION OF MODAL PARAMETERS OF A LATTICE TOWER UNDER ENVIRONMENTAL CONDITIONS Sören Kai Möller, Clemens Jonscher, Tanja Grießmann and Raimund Rolfes	
16:00-16:30	**Coffee break**				
	Room T.1.1	**Room T.1.2**	**Room T.1.3**	**Room T.2.1**	**Room T.2.2**
	S. Pereira, Á. Cunha	**C. Gentile, A. D'Alessandro**	**A. Malekjafarian, C.-W. Kim**	**E. Figueiredo, J. Kullaa**	**L. J Prendergast, A. Malekjafarian**
	SS06 Real world applications of OMA-based testing and monitoring	**SS18 Vibration-based assessment and monitoring of bridges**	**SS20 Indirect monitoring of civil infrastructure using moving vehicles**	**SS15 Machine learning for damage identification under operational and environmental effects**	**SS17 Vibration-based health monitoring of offshore structures**
16:30-16:45	VIBRATION-BASED MONITORING FOR NON-DESTRUCTIVE TESTING OF POST-TENSIONING EXTERNAL TENDONS Jaime H. Garcia Palacios, Ivan M Diaz, Javier Naranjo-Pérez and Carlos M.C. Renedo	DATA-BASED CONDITION AND PROGNOSIS STATEMENTS OF BRIDGE STRUCTURES VIA STANDARDISED MONITORING SYSTEMS Thorben Geers, Achim Geßler and Benno Hoffmeister	A NETWORK-LEVEL APPROACH FOR BRIDGE CONDITION MONITORING USING IN-VEHICLE MEASUREMENTS Robert Corbally and Abdollah Malekjafarian	DEVELOPMENT IN MACHINE LEARNING BASED RAPID VISUAL SCREENING METHOD FOR MASONRY BUILDINGS Nurullah Bektas and Orsolya Kegyes-Brassai	PREDICTION OF STRAIN QUANTITIES OF AN OFFSHORE WIND TURBINE USING DYNAMIC INFORMATION AND OPERATIONAL SCADA DATA Eleonora Maria Tronci, Bridget Moynihan, Anna Haensch, Babak Moaveni, Eric Hines and Finn Rüdinger
16:45-17:00	EFFECT OF CHANGING ENVIRONMENT ON THE DYNAMIC CHARACTERISTICS OF AN OVERPASS Carmelo Gentile, Marco Pirrò and Fulvio Busatta	STRUCTURAL MONITORING: MODAL TRACKING WITH LORAWAN WIRELESS SYSTEMS AND AUTOMATIC CLOUD ALGORITHMS Matteo Maccanti, Paolo De Lellis, Andrea Sala, Marco Galli and Matteo Giorgi	EXPLORING THE USE OF BICYCLES AS EXCITERS AND SENSOR CARRIERS FOR INDIRECT BRIDGE MODAL PARAMETER ESTIMATION Richard May, Thomas Reynolds, Hwa Kian Chai and Yong Lu	CONVOLUTIONAL NEURAL NETWORKS FOR DAMAGE IDENTIFICATION IN STEEL-CONCRETE COMPOSITE BEAMS Antonio Bilotta, Antonino Morassi and Emilio Turco	FREQUENCY ANALYSIS OF MONOPILES WITH MASING-TYPE HYSTERESIS DAMPING UNDER LARGE-STRAIN CYCLIC LOADING Jacques Tott-Buswell, Joseph Hilton, Stra Berberic, Saleh Jalbi and Luke Prendergast
17:00-17:15	IN DEPTH ASSESSMENT OF A PRE-STRESSED CONCRETE ROAD BRIDGE BASED ON DYNAMIC BRIDGE BEHAVIOUR – FOLLOW-UP ANALYSIS OF STRUCTURAL INTEGRITY AND EVALUATION OF MAINTENANCE CONDITION Robert Veit-Egerer, Theresa Reimoser, Andreas Schmitt and Yvonne Benitz	OPTIMAL CONDITIONS FOR CARRYING OUT AN OMA ON BRIDGES AND VIADUCTS, BOTH IN TERMS OF ENVIRONMENTAL EXCITATION AND THE TYPE OF TRANSDUCERS USED Giorgio Sforza and Vladyslav Samoylenko		STRUCTURAL DAMAGE IDENTIFICATION ACCOUNTING FOR VARYING ENVIRONMENTAL AND OPERATIONAL CONDITIONS USING DEEP LEARNING Ana Fernandez-Navamuel, Diego Zamora-Sanchez, David Garcia-Sanchez, David Pardo and Filipe Magalhaes	A SHAKE-TABLE TEST TO EVALUATE FIBER OPTIC VIBRATION MONITORING OF OFFSHORE WIND TURBINES James Xu, Linqing Luo, Jaewon Saw, Chien-Chih Wang, Sumeet Sinha, Kenichi Soga, Yuxin Wu and Matthew DeJong

17:15-17:30		DYNAMIC MONITORING PLANT INTEGRATED WITH A WEIGH IN MOTION APPARATUS AIMED AT HAVING A MORE COMPLETE SHM SYSTEM. Giorgio Sforza, Matjaž Skobir, Vladyslav Samoylenko and Martin Hauptman		DOES CLIMATE CHANGE IMPACT LONG-TERM DAMAGE DETECTION IN BRIDGES? Eloi Figueiredo, Nuno Peres, Ionut Moldovan and Amro Nasr	

August 31

Keynotes

Prof. Anne S. Kiremidjian

A Systems Approach to Wireless Structural Health Monitoring

A comprehensive structural health monitoring system consists of a set of sensors, a wireless communications module, damage diagnosis and prognosis module and information delivery module. Each of these components require to work in a reliable and efficient manner. The system needs to be scalable and easily upgradable. In this presentation, the components of a comprehensive wireless structural health monitoring system will be presented discussing recent developments for each component. While sensors, wireless communications and computational capabilities have significantly advanced reaching a widespread level of acceptance, challenges remain with damage diagnosis and prognosis algorithms. Similarly, robust decision support systems that are versatile and can manage the system while delivering useful information to users are still lacking. The challenges damage diagnosis and prognosis and decision support systems will be discussed. Impediments to widespread implementation of such systems in practice will also be presented.

8:30-9:00	**Participant registration**				
	Room T.1.3				
9:00-10:00	**Keynote lecture by Prof. A. S. Kiremidjian Chairs: Prof. G. Lombaert and Prof. F. Perotti**				
	Room T.1.1	**Room T.1.2**	**Room T.1.3**	**Room T.2.1**	**Room T.2.2**
Chairs	**A. Cigada, C. Stoura**	**V. Racic, M. G. Mulas**	**S. Quqa, E. M. Tronci**	**J. Dang, M. Nishio**	**C. Rainieri, C. Gentile**
Special Session	**SS01 Vibration-based structural health monitoring for railway infrastructure**	**SS05 Human-induced vibrations**	**SS02 The role of traffic in bridge condition monitoring**	**SS10 Machine learning and data-driven methods for structural dynamics**	**SS14 Dynamic identification and vibration-based structural health monitoring of historical and modern towers**
10:00-10:15	CONTINUOUS SHM OF RAILWAY BRIDGES BASED ON VIBRATION ANALYSIS OF QUALITATIVE, SELECTED, ASYNCHRONOUS DATA Sébastien Judenherc and Nicolas Poitrineau	SYNCHRONIZATION ISSUE IN DATA ACQUISITION ON ANDROID PHONES FOR ACCELERATION RECORDINGS Luca Martinelli and Daniel Valdivieso	FE MODEL UPDATING OF CABLE-STAYED BRIDGES BASED ON THE EXPERIMENTAL ESTIMATE OF CABLE FORCES AND MODAL PARAMETERS Marco Martino Rosso, Angelo Aloisio, Dag Pasquale Pasca, Giuseppe Carlo Marano and Bruno Briseghella	RESEARCH ON HYSTERESIS MODEL OF HIGH DAMPING RUBBER BEARING WITH NEURAL NETWORKS Kyeonghoon Park, Taiji Mazda, Yukihide Kajita and Yuki Fujiwara	MONITORING OF THE DYNAMIC BEHAVIOUR OF A TV TOWER Volkmar Zabel and Simon Marwitz
10:15-10:30	MODAL STRAIN-BASED STRUCTURAL HEALTH MONITORING OF STEEL RAILWAY BRIDGES: AN OVERVIEW OF THREE RECENT CASE STUDIES Dimitrios Anastasopoulos and Edwin Reynders	DYNAMIC RESPONSE OF A LIVELY FOOTBRIDGE UNDER WALKING PEDESTRIANS Alfredo Cigada, Maria Gabriella Mulas and Lucia Zerruso	PHYSICS-BASED AND MACHINE-LEARNING MODELS FOR BRAKING IMPACT FACTORS Angelo Aloisio, Giuseppe Quaranta, Alessandro Contento and Marco Rosso	CITY SCALE SEISMIC-DAMAGE PREDICTION OF BUILDINGS USING QUANTUM NEURAL NETWORK Sanjeev Bhatta and Ji Dang	DYNAMIC IDENTIFICATION AND AUTOMATIC UPDATING OF THE NUMERICAL MODEL OF A MASONRY TOWER Georgios Panagiotis Salachoris, Gianluca Standoli, Mattia Schiavoni and Francesco Clementi
10:30-10:45	SIMULATION OF THE RUPTURE OF THE CONTACT WIRE OF A HIGH SPEED CATENARY Antonietta Lo Conte, Giuseppe Bucca and Andrea Collina	SERVICEABILITY ASSESSMENT OF A RETROFITTED FOOTBRIDGE PRONE TO LATERAL VIBRATION Patrick Bamonte and Federico Perotti	DYNAMIC TESTS WITH HARD BRAKING HEAVY VEHICLES ON A MOTORWAY BRIDGE Glauco Feltrin and Matteo Breveglieri	STRUCTURAL DAMAGE DIAGNOSIS OF WIND TURBINE BLADES BASED ON MACHINE LEARNING TECHNIQUES José Figueroa, José M. Saavedra, José F. Delpiano and Rodrigo Astroza	MONITORING THE MODAL PARAMETERS OF A HISTORICAL BELFRY IN EARTHQUAKE PRONE REGION Carlo Rainieri, Luigi Cieri and Giovanni Fabbrocino
10:45-11::00	A SIMULATION STUDY ON CHARACTERIZING TRANSFER FUNCTIONS OF RAILWAY TRACKS USING TRAIN-BORNE LASER DOPPLER VIBROMETER Yuanchen Zeng, Alfredo Núñez and Zili Li	DYNAMIC RESPONSE OF A CONTROLLED FRP FOOTBRIDGE: IMPLICATIONS OF HUMAN-STRUCTURE INTERACTION PHENOMENON Ivan M Diaz, Christian Gallegos-Calderon, Javier Naranjo-Perez and Christian A Barrera-Vargas	DETERMINING BRAKING FORCES ON BRIDGES USING MONITORED TRAFFIC DATA AND STOCHASTIC SIMULATION Matteo Breveglieri and Glauco Feltrin	DATA GENERATION FOR TESTING-INTEGRATED MODELING OF NONLINEAR DYNAMIC SYSTEMS Pavle Milicevic and Okyay Altay	

11:00-11:30	**Coffee break**				
Chairs	**A. Cigada, C. Stoura**	**V. Racic, M. G. Mulas**	**A. Aloisio, R. Corbally**	**J. Dang, M. Nishio**	**L. Iannacone, V. Zabel**
Special Session	**SS01 Vibration-based structural health monitoring for railway infrastructure**	**SS05 Human-induced vibrations**	**SS03 Recent advancements in vehicle-bridge interaction problems**	**SS10 Machine learning and data-driven methods for structural dynamics**	**SS07 System identification for infrastructure components subject to deterioration**
11:30-11:45	MONITORING RAILWAY INFRASTRUCTURE THROUGH A FREIGHT WAGON EQUIPPED WITH SMART SENSORS Federico Zanelli, Ivano La Paglia, Nicola Debattisti, Marco Mauri, Davide Tarsitano and Edoardo Sabbioni	EXPERIMENTAL DERIVATION OF DYNAMIC LOADING FACTORS FOR STRUCTURAL GLASS PEDESTRIAN SYSTEMS Chiara Bedon, Marco Fasan and Salvatore Noè	VIBRATION SERVICEABILITY OF A CONTINUOUS SPAN CABLE-STAYED BRIDGE Shinya Kimura, Hiroyuki Sugiyama, Chul-Woo Kim and Kazuyuki Ono	STORY-BY-STORY BUILDING DAMAGE RECOGNITION FROM CHANGES OF WAVE PROPAGATION BETWEEN TWO ADJACENT FLOORS USING CNN Aijia Zhang, Xin Wang and Ji Dang	IMPACTS BETWEEN DIFFERENT DROP MASSES AND DIFFERENT TARGETS IN DIFFERENT SCALES Lutz Auersch
11:45-12:00	A METHODOLOGY TO ESTIMATE RAILWAY TRACK CONDITIONS FROM VEHICLE ACCELERATIONS BASED ON MULTIVARIATE REGRESSION Ivano La Paglia, Egidio Di Gialleonardo, Alan Facchinetti, Marco Carnevale and Roberto Corradi	A REAL-TIME MONITORING STRATEGY FOR THE ASSESSMENT OF VIBRATION LEVELS ON STADIUM GRANDSTANDS DURING REAL EVENTS Simone Turrisi, Emanuele Zappa, Alfredo Cigada and Francesco Romanò	HEALTH MONITORING OF BRIDGES ADOPTING AN INFLUENCE LINE-BASED DAMAGE INDEX EXTRACTED WITH A NON-CONTACT COMPUTER VISION STRATEGY Alberto Martini, Eleonora Tronci, Maria Feng and Ryan Feng	ESTIMATION OF VIBRATION CHARACTERISTICS FOR A BRIDGE SOIL-STRUCTURE SYSTEM BY SUBSPACE MODEL IDENTIFICATION USING MULTI-POINT MONITORING SEISMIC RECORDS Yosuke Ishii, Yoshihiro Nakao and Gaku Shoji	PARAMETER ESTIMATION FOR SEISMIC ISOLATION STRUCTURES UNDER POUNDING PROBLEMS BY UNSCENTED KALMAN FILTER Xinhao He, Shigeki Unjoh and Dan Li
12:00-12:15	RECONSTRUCTION OF THE STRESSES IN A RAILWAY BRIDGE DURING TRAIN PASSAGE BY MEANS OF VIRTUAL SENSING Kristof Maes and Geert Lombaert	A TOPOLOGY OPTIMIZATION-BASED METHOD FOR STRUCTURAL VIBRATION SERVICEABILITY DESIGN OF LARGE-SPAN STRUCTURES UNDER HUMAN EXCITATION Yu Zhong, Bingxu Liao, Mengdie Hu and Haoqi Wang	FUSING MODAL PARAMETERS AND CURVATURE INFLUENCE LINES FOR DAMAGE LOCALIZATION UNDER VEHICLE EXCITATION Said Quqa and Luca Landi	A PRELIMINARY STUDY ON PHYSICS-INFORMED MACHINE LEARNING-BASED STRUCTURE HEALTH MONITORING FOR BEAM STRUCTURES Tran Tien Dat, Yasunao Matsumoto and Ji Dang	MEASURED DETERIORATION SIGNALS IN STRUCTURES AND THEIR IMPLICATIONS Alan Jeary, Thomas Winant and John Bunyan
12:15-12:30	VIBRATION-BASED MONITORING OF CONTINUOUS WELDED RAILS Alireza Enshaeian, Matthew Belding And Piervincenzo Rizzo		AN UNSUPERVISED LEARNING METHOD FOR INDIRECT BRIDGE STRUCTURAL HEALTH MONITORING Andres Felipe Calderon Hurtado, Mehrisadat Makki Alamdari, Elena Atroshchenko, Chul-Woo Kim and Kai-Chun Chang	SYSTEM FRAGILITY ANALYSIS OF A HORIZONTALLY CURVED MULTI-SPAN HIGHWAY BRIDGE STRUCTURE Muhammad Rashid and Mayuko Nishio	STRESS ANALYSIS OF CONCRETE GRAVITY DAMS USING TIME DOMAIN SPECTRAL FINITE ELEMENT METHOD UNDER THE ACTION OF SEISMIC GROUND MOTION Avirup Sarkar and Ashutosh Bagchi
12:30-14:00	**Lunch**				
	Room T.1.3				
	Industrial Plenary Presentations **Chair: Prof. M. P. Limongelli and Prof. Ji Dang**				

14:00-14:15	Introduction				
14:15-14:30	**KINEMETRICS** Upgrading the world's most extensive building instrumentation network				
14:30-14:45	**SACERTIS INGEGNERIA** SHM systems in civil engineering: complex structures explained				
14:45-15:00	**MOVE SOLUTIONS** Innovative Wireless Structural Health Monitoring for Railway Viaducts: Move Solutions Applied Project				
15:00-15:15	**DEWESOFT & PCB PIEZOTRONICS** How to optimize structural monitoring systems				
15:15-15:30	**STRUCTURAL VIBRATION SOLUTIONS** Reduction of False Alarms in Damage Detection of Civil Engineering Structures				
15:30-15:45	**G&P INTECH** Seismic retrofitting of Bella Vista condominium				
15:45-16:00	**S2X** Monitoring the vibration response of the School of Engineering Main Building at University of Naples "Federico II" to an "earthquake of joy"				
16:00-16:30	**Coffee break**				
	Room T.1.1	**Room T.1.2**	**Room T.1.3**	**Room T.2.1**	**Room T.2.2**
Chairs	**L. Martinelli, W. Lienhart**	**P. F. Giordano, M. P. Limongelli**	**C. Rainieri, D. Skolnik**	**J. Dang, D. G. Sanchez**	**L. Iannacone, V. Zabel**
Special Session	**SS24 Fiber optic and innovative sensors for monitoring existing structures and infrastructures**	**SS04 Challenges in SHM development: deterioration assessment and value of information**	**SS22 Industrial advanced applications of vibration-based monitoring**	**SS10 Machine learning and data-driven methods for structural dynamics**	**SS07 System identification for infrastructure components subject to deterioration**
16:30-16:45	DISTRIBUTED VIBRATION MONITORING OF BRIDGES WITH FIBRE OPTIC SENSING SYSTEMS Werner Lienhart, Lisa Strasser and Shamim Miah	OPTIMIZATION OF STRUCTURAL HEALTH MONITORING FOR BRIDGES NETWORKS BY COMBINING TRADITIONAL AND INNOVATIVE TECHNIQUES Andrea Miano, Alessandro Lubiano Lobianco, Annalisa Mele, Antimo Fiorillo, Marco Di Ludovico and Andrea Prota	THERMAL EFFECTS ON BRIDGES DYNAMIC BEHAVIOUR Paola Darò, Monica Longo, Dario La Mazza, Benito De Cicco, Paolo Chiariotti, Stefano Manzoni, Alfredo Cigada and Giuseppe Mancini	UNSUPERVISED DAMAGE LOCALIZATION USING AUTOENCODERS WITH TIME-SERIES DATA Niklas Römgens, Abderrahim Abbassi, Clemens Jonscher, Tanja Grießmann and Raimund Rolfes	NUMERICAL SIMULATION OF CONTACT ACOUSTIC NONLINEARITIES IN DAMAGED CFRP LAMINATES THROUGH LASER-INDUCED GUIDED WAVES Shain Azadi and Valter Carvelli

16:45-17:00	SHM SYSTEM PROTOTYPE FOR SERIAL STRUCTURES OPERATING UNDER DIFFERENT CONDITIONS Aleksey Mironov, Andris Chate, Aleksejs Safonovs, Pavel Doronkin and Vitalijs Kuzmickis	VALUE OF SEISMIC STRUCTURAL HEALTH MONITORING INFORMATION FOR MANAGEMENT OF CIVIL STRUCTURES UNDER DIFFERENT PRIOR KNOWLEDGE SCENARIOS Pier Francesco Giordano, Maria Pina Limongelli	USE OF GROUND-BASED INTERFEROMETRIC RADARS (GB-INRA) FOR REMOTE REAL-TIME MONITORING OF CRITICAL INFRASTRUCTURES Giulio Telleschi, Francesco Coppi, Matthias Twardzik and Alessandro Pettinari	GAUSSIAN PROCESS REGRESSION SURROGATE MODEL FOR SEISMIC VULNERABILITY ASSESSMENT OF HIGHWAY BRIDGE STRUCTURE SYSTEM Taisei Saida, Muhammad Rashid and Mayuko Nishio	IMPROVED EULER-MARUYAMA SCHEME FOR THE CALIBRATION OF DETERIORATION MODELS Leandro Iannacone and Paolo Gardoni
17:00-17:15	ULTRA-LONG LARGE-CAPACITY FBG SENSING FOR LONG-HAUL POWERLINES MONITORING Zeyuan Yang, Jie Liu, Bing Han, Zinan Wang, Shisheng Dong and Yunjiang Rao	FORECASTING THE VALUE OF VIBRATION-BASED MONITORING INFORMATION IN STRUCTURAL INTEGRITY MANAGEMENT Giancarlo Costa, Maria Pina Limongelli and Sebastian Thöns	PHOTOMONITORING: AN INNOVATIVE REMOTE SENSING SOLUTION FOR THE STATIC AND DYNAMIC MONITORING OF STRUCTURES AND INFRASTRUCTURES Andrea Chessa, Michele Gaeta, Antonio Cosentino and Marco Fiorio	ESTIMATION OF SEISMIC DISPLACEMENT RESPONSE USING A KALMAN FILTER WITH DATA-DRIVEN STATE-SPACE MODEL IDENTIFICATION Yuki Kakiuchi, Yaohua Yang, Masaru Kitahara and Tomonori Nagayama	IDENTIFICATION OF DAMAGE IN TRUSS AND BEAM STRUCTURES BASED ON FLEXIBILITY MATRIX Martina Modesti, Cristina Gentilini, Antonio Palermo, Edwin Reynders and Geert Lombaert
17:15-17:30	A TEXTILE EMBEDDED WITH DISTRIBUTED FIBER OPTIC SENSORS FOR PEDESTRIAN BRIDGE MONITORING Sabrina Abedin, Andres M. Biondi, Lidan Cao, Rui Wu, Tzuyang Yu and Xingwei Wang	CHANGES OF SHEAR-WAVE VELOCITY BY STRUCTURAL DAMAGES OF A SPECIMEN OF AN 18-STORY STEEL BUILDING CONSIDERING THE DISPERSION DUE TO BENDING DEFORMATION Xin Wang	A SEISMIC WAVE PROPAGATION MODEL FOR THE ANALYSIS OF DAM-FOUNDATION-RESERVOIR SYSTEMS: THE CASE STUDY OF MONTICELLO DAM Giorgia Faggiani and Piero Masarati	PROBABILISTIC REGRESSION MODEL FOR OMA-BASED DAMPING ESTIMATES OF A CABLE-STAYED BRIDGE Sunjoong Kim, Doyun Hwang and Ho-Kyung Kim	DECONVOLUTION OF CONTAMINATED ACCELERATION SIGNALS RECORDED VIA MOVING SENSORS ON BRIDGES Fouad Amin and Mohammad Alhamaydeh
17:30-17:45	A PRELIMINARY CASE STUDY ON THE DYNAMIC TESTING OF A MASONRY ARCH RAIL BRIDGE USING A DISTRIBUTED FIBER OPTIC SENSING SYSTEM Liangliang Cheng, Alfredo Cigada, Emanuele Zappa, Matthew Gilbert and Ziqiang Lang		MEASURING UNDER HIGH VOLTAGE IN RAILWAYS - A PANTOGRAPH MONITORING SOLUTION Rita Lima		

September 1

Keynotes

Prof. Keith Worden

An Overview of Population-Based SHM

One of the main problems in data-based Structural Health Monitoring (SHM), is the scarcity of measured data corresponding to damage states in the structures of interest. One approach to solving this problem is to develop methods of transferring health inferences and information between structures in an identified population—Population-based SHM (PBSHM). In the case of homogenous populations (sets of nominally-identical structures, like in a wind farm), the idea of the form has been proposed which encodes information about the ideal or typical structure together with information about variations across the population. In the case of sets of disparate structures—heterogeneous populations—transfer learning appears to be a powerful tool for sharing inferences, and is also applicable in the homogenous case. In order to assess the likelihood of transference being meaningful, it has proved useful to develop an abstract representation framework for spaces of structures, so that similarities between structures can formally be assessed; this framework exploits tools from graph theory. The current paper and presentation discusses all of these very recent developments and provides illustrative examples.

Prof. Antonina Pirrotta

Hilbert Transform and Stochastic Mechanics Meet Operational Modal Analysis (OMA)

Operational modal analysis (OMA) methods are nowadays common in civil, mechanical and aerospace engineering to identify and monitor structural systems without any knowledge on the structural excitation provided that the latter is due to ambient vibrations. For this reason, OMA methods are embedded with stochastic concepts and then it is difficult for users that have no-knowledge in signal analysis and stochastic dynamics. In this paper an innovative method usefull for Structural Health Monitoring (SHM) is proposed. It is based on the signal filtering and on the Hilbert transform of the correlation function matrix. Specifically, the modal shapes are estimated from the correlation functions matrix of the filtered output process and then the frequencies and the damping ratios are estimated from the analytical signals of the mono-component correlation functions: a complex signals in which the real part represents the correlation function and the imaginary part is its Hilbert transform. This method is very simple to use since requires only few interactions with the users and thus it can be used also from users that are not experts in the aforementioned areas. In order to prove the reliability of the proposed method, numerical simulations and experimental tests are reported also considering comparisons with the most popular OMA method.

8:30-9:00	**Participant registration**			
	Room T.1.3			
9:00-10:00	**Keynote lecture by Prof. K. Worden** **Chairs: Prof. M. G. Mulas and Prof. R. Astroza**			
	Room T.1.1	**Room T.1.3**	**Room T.2.1**	**Room T.2.2**
Chairs	**S. Oliveira, A. Alegre**	**N. M. Çağlar, M. I. Todorovska**	**E. Erduran, S. Gonen**	**J. Dang, Y. Narazaki**
Special Session	**SS09 Vibration analysis on large dams. Seismic and structural health monitoring**	**SS13 Structural health monitoring of buildings in seismic-prone areas**	**SS19 Indirect methods for monitoring of transport infrastructure**	**SS21 Unmanned vehicles, robotics, and 3D vision technologies in civil engineering for inspection automation and system resilience**
10:00-10:15	AMBIENT VIBRATION DATA - BASED MODAL PARAMETER ESTIMATION AND NUMERICAL MODEL CALIBRATION OF AN ARCH DAM Xiangfeng Guo, Frédéric Dufour and Nicolas Humbert	MONITORING-DRIVEN POST-EARTHQUAKE BUILDING DAMAGE TAGGING Yves Reuland, Panagiotis Martakis and Eleni Chatzi	TRUSS RAILWAY BRIDGE INDIRECT FREQUENCY ESTIMATION BY TIME-SHIFTED ACCELERATIONS DIFFERENCE Lorenzo Bernardini, Kodai Matsuoka, Claudio Somaschini, Marco Carnevale and Andrea Collina	MULTI-CLASS DAMAGE DETECTION FOR AUTONOMOUS POST-DISASTER RECONNAISSANCE USING QUANTUM CONVOLUTIONAL NEURAL NETWORK Sanjeev Bhatta and Ji Dang
10:15-10:30	AMBIENT VIBRATION MEASUREMENTS: FEEDBACKS FROM MEASUREMENTS ON 20 CONCRETE DAMS AND COMPARISONS WITH FINITE-ELEMENT ANALYSES. FOCUS ON ONE YEAR OF RECORDING ON AN ARCH Nicolas Humbert, Emmanuel Robbe, Barthelemy Steck and Thierry Guilloteau	TONGDE PLAZA YUE CENTER (TPYC) FULL-SCALE TESTBED SITE: PRELIMINARY (FIXED-BASE) DIGITAL TWIN Alimu Aihemaiti and Maria Todorovska	A NOVEL DRIVE-BY SYSTEM IDENTIFICATION APPROACH FOR BRIDGES UTILIZING A MODAL FRF SIMILARITY CRITERION AND SOFT-IMPUTING Mohammad Talebi Kalaleh and Qipei Mei	INTEGRATED 3D STRUCTURAL ELEMENT AND DAMAGE IDENTIFICATION: DATASET AND BENCHMARKING Katrina Mae Montes, Molan Zhang, Jiaming Liu, Lama Hajmousa, Zhiqiang Chen and Ji Dang
10:30-10:45	SSHM SYSTEMS FOR DAMS: 12 YEARS' EXPERIENCE IN CAHORA BASSA DAM. EQUIPMENT, SOFTWARE, AND MAIN RESULTS Ezequiel Carvalho, Bruno Matsinhe, Paulo Mendes, Sérgio Oliveira, André Alegre, Mauricio Ciudad-Real, Derek Skolnik and Mohamed El-Idrissi	EXPERIMENTAL SYSTEM IDENTIFICATION AND DAMAGE DETECTION IN STEEL-CONCRETE COMPOSITE FRAMES SUBJECTED TO MONOTONIC AND CYCLIC LATERAL LOADS Georgios Balaskas, Rafaela Don, Cristian Vulcu and Benno Hoffmeister	EVALUATION OF FREQUENCY CONTENT OF ACCELERATIONS RECORDED ON TRAINS CROSSING MULTI-SPAN BRIDGES Emrah Erduran, Semih Gonen, Fredrik Pettersen and Albert Lau	SPATIO-TEMPORAL FREQUENCY EVALUATION OF A RAILROAD BRIDGE CONSIDERING VEHICLE-BRIDGE INTERACTION Jaehun Lee and Robin Eunju Kim
10:45-11::00	VIBRATION ANALYSIS FOR MODEL CALIBRATION AND STRUCTURAL CONDITION ASSESSMENT OF CAHORA BASSA DAM CONSIDERING THE CONCRETE SWELLING EFFECTS André Alegre, Sérgio Oliveira, Paulo Mendes, Ezequiel Carvalho and Bruno Matsinhe	OPTIMAL LOCATION OF STRONG GROUND MOTION SENSORS FOR SEISMIC EMERGENCY MANAGEMENT Nilgun Merve Caglar and Maria Pina Limongelli	EFFECT OF ROAD ROUGHNESS ON THE DYNAMIC RESPONSE OF VEHICLES IN VEHICLE-BRIDGE INTERACTION MODELING Kultigin Demirlioglu, Semih Gonen and Emrah Erduran	DAMAGE EVALUATION IN EARTHQUAKE EVENTS BY NONLINEARITY EXTRACTION FROM VIDEO DATA: EXPERIMENT VERIFICATION Sifan Wang and Mayuko Nishio
11:00-11:30	**Coffee break**			

	S. Oliveira, A. Alegre	C. Bedon, M. P. Limongelli	M. Döhler, M.G. Masciotta	J. Dang, Y. Narazaki
	SS09 Vibration analysis on large dams. Seismic and structural health monitoring	**SS25 Vibrations in timber structures: a focus on experiments, damage detection techniques, numerical models, open issues**	**SS08 Uncertainties in system identification and damage diagnosis**	**SS21 Unmanned vehicles, robotics, and 3D vision technologies in civil engineering for inspection automation and system resilience**
11:30-11:45	DETERMINATION OF SAMPLE SIZE ON SURROGATE MODEL-BASED PARAMETER INVERSE ANALYSIS OF A SUPER-HIGH ARCH DAM Xi Liu, Maria Pina Limongelli and Fei Kang	SERVICEABILITY CRITERIA FOR TIMBER FLOORS VIBRATION Angelo Aloisio, Roberto Tomasi, Yuri De Santis, Thomas Hillberger, Dag Pasquale Pasca, Marco Martino Rosso, Chiara Bedon, Pier Francesco Giordano and Maria Giuseppina Limongelli	EFFICIENT SUBSPACE-BASED OPERATIONAL MODAL ANALYSIS USING VIDEO-BASED VIBRATION MEASUREMENTS Zhilei Luo, Michael Döhler, Vincent Baltazart and Qinghua Zhang	FINITE ELEMENT MODELING OF THIN-WALLED STEEL STRUCTURAL MEMBERS FROM 3D POINT CLOUDS Tomoya Nakamizo and Mayuko Nishio
11:45-12:00	OPERATIONS AND DAM SAFETY WITH THE KMIDAM PLATFORM Mohamed El Idrissi, M. Khalid Saifullah, Mauricio Ciudad-Real, Derek Skolnik and Edelvays Spassov	SYSTEM IDENTIFICATION OF TWO SIX-STORY LIGHT-WEIGHT TIMBER FRAME BUILDINGS USING AMBIENT VIBRATION MEASUREMENTS AT DIFFERENT ENVIRONMENTAL CONDITIONS Carmen Amaddeo and Michael Dorn	MODEL ORDER SELECTION FOR UNCERTAINTY QUANTIFICATION IN SUBSPACE-BASED OMA OF VESTAS V27 BLADE Szymon Gres and Michael Döhler	A CRITICAL ANALYSIS BASED ON THE COMPARISON BETWEEN TRADITIONAL AND ADVANCED APPROACHES TO THE VISUAL INSPECTION OF BRIDGES AND VIADUCTS. Silvia Manarin, Mariano Angelo Zanini, Flora Faleschini and Carlo Pellegrino
12:00-12:15	SOFTWARE DEVELOPMENT FOR AUTOMATIC STRUCTURAL HEALTH MONITORING OF CABRIL DAM André Alegre, Sérgio Oliveira, Paulo Mendes and Jorge Proença	AUTOMATIC IDENTIFICATION OF STRUCTURAL MODAL PARAMETERS UNDER AMBIENT EXCITATION AND ITS APPLICATION TO HERITAGE TIMBER STRUCTURES Wei Liu, Na Yang, Fan Bai and Donato Abruzzese	MODAL ANALYSIS OF A STEEL TRUSS BRIDGE UNDER VARYING ENVIRONMENTAL CONDITIONS Michal Venglar, Daniel Beutelhauser and Marián Sýkora	A LARGE-SCALE 3D POINT CLOUD DATASET FOR AUTONOMOUS BRIDGE INSPECTION Yasutaka Narazaki, Haojia Cheng, Wenhao Chai, Jiabao Hu, Wenhao Ruan and Mingyu Shi
12:15-12:30		EFFECT OF INTER-PANEL CONNECTIONS ON MODAL PROPERTIES OF CLT FLOORS Vitomir Racic, Marija Nefovska-Danilović, Marija Milojević and Miroslav Marjanović	LINEAR SYSTEM IDENTIFICATION AND BAYESIAN MODEL UPDATING OF THE UC SAN DIEGO GEISEL LIBRARY Lin Sun, Joel Conte, Todd Michael, Jose Restrepo, Rodrigo Astroza, Mukesh Ramancha and Yehuda Bock	BRIDGE MODAL IDENTIFICATION USING A SCALED-UP ELECTRIC MOBILE PLATFORM: A VEHICLE BRIDGE INTERACTION BASED APPROACH Dario Fiandaca, Alberto Di Matteo and Antonina Pirrotta
12:30-12:45		THE ROLE OF IN-FIELD EXPERIMENTS FOR THE DEFINITION OF PROCEDURAL GUIDELINES ON THE "CASE PROJECT" TIMBER BUILDINGS IN L'AQUILA Martina Sciomenta, Chiara Bedon and Danilo Ranalli	DYNAMIC CHARACTERIZATION FOR THE STRUCTURAL INTEGRITY ASSESMENT OF A XIII CENTURY CHURCH WITH PROVISIONAL STRUCTURES Noemi Fiorini, Roberto Acerbis and Antonio Raschillà	
12:30-14:00	Lunch			
	Room T.1.3			
14:00-15:00	**Keynote lecture by Prof. A. Pirrotta** **Chairs: K. Worden and M. G. Mulas**			
15:00-15:30	**Closing Ceremony**			

TECHNICAL VISITS

During the concluding day of EVACES 2023, September 1, several exciting technical visits will provide participants with hands-on experiences and insights into the latest advancements in the field of experimental vibration analysis and vibration-based monitoring.

GVPM Wind Tunnel

GVPM is a special closed-circuit wind tunnel, arranged in a vertical layout with two test rooms located on the opposites sides of the loop. The first one is located in the lower part of the loop and is suitable for Low Turbulence tests. The second one, bigger, is located in the upper part of the loop and is intended for civil engineering testing (the Boundary Layer Test Section). Due to this unique feature, GVPM offers the widest possible range of test arrangements and alternatives. The facility is powered by a flow generator array of 14 1.8m diameter, 100kW, fans, for a total power of 1.4 MW. The fans are organized in two rows of seven 2x2m independent cells. Independent inverters drive the fans allowing for continuous control of the rotation speed of each fan to obtain the desired wind speed in the test section.
GVPM has significant experience in many relevant topics related to the fluid-structure interaction. The wind tunnel has developed several test layouts to achieve excellent measurement solutions.
Portfolio of research and commercial projects performed at GVPM during the years. GVPM has proved expertise documented by the relevant number of completed projects.

Where: Politecnico di Milano, Bovisa Campus – Laboratorio Galleria del Vento, Building B19, Via La Masa 34, 20156 Milano, Italy. The Bovisa Campus can be easily reached by

public transportation since it is located close to the Bovisa railway station. Getting out from the station, turn right, walk down the stairs, cross the street and walk into the campus. A campus pedestrian entrance close to the wind tunnel building is in via Lambruschini 15.

San Siro Stadium

The San Siro Stadium, named after the Milanese district in which it is located, is considered an iconic sports monument and one of the excellence symbols for the city of Milan. For these reasons it has earned the title "La Scala del Calcio" for the number of big events it hosts: not just football matches of the two renowned football teams playing here, Inter and Milan, but also international events, like the Champions League final in 2016. Since the 70s San Siro has been the scene for great concerts, welcoming Italian and international artists. In its position as a bridge between history (its construction started in 1926) and future, the San Siro stadium hosted two popes and it is the big theater for the opening ceremony of the winter Olympic Games Milano Cortina. As a unique and widely used infrastructure, it requires continuous care for prompt maintenance: for this reason, since 2003, a massive structural health monitoring of the main structures has been started by the municipality of Milano, Inter and Milan, and Politecnico di Milano. A network of more than 250 sensors monitor the static and dynamic motion of tiers, corrosion and carbonation of the sub-structures, also offering a unique experimental lab for research on structural health monitoring and human structure interaction.

Where: Piazzale Angelo Moratti, 20151 Milan, Italy. Public transportation offers convenient access to the San Siro Stadium. You can take the subway Line M5 (Lilla Line) to the SAN SIRO STADIO stop, or Line M1 (Red Line) to PIAZZALE LOTTO stop, and then stroll along Viale Caprilli Street to the stadium. Additionally, various bus options are available, including bus 49 (Piazza Tirana-San Cristoforo), bus 78 (Bisceglie M1-Via Govone), bus 64 (Bonola-Lorenteggio), bus 80 (De Angeli-Quinto Romano), and bus 98 (Famagosta M2-Piazzale Lotto M1M5). For an alternative route, you can choose tram line 16 (Monte Velino-San Siro).

Milan Duomo

Situated at the core of Milan, the Milan Cathedral, also known as the Milan Duomo, stands as one of the city's most revered symbols. Its origins trace back to 1386, and the monumental effort to construct it spanned nearly six centuries. Crafted mainly from Candoglia marble, the cathedral boasts a commanding presence and a distinctive white hue.
Renowned for its breathtaking allure, intricate embellishments, and historical significance, the Milan Duomo is an essential stop for all Milan visitors. It offers a glimpse into the opulence and magnificence of medieval Gothic architecture. The Duomo is equipped with a sophisticated static and dynamic monitoring system.

Where: Duomo di Milano, P.za del Duomo, 20122 Milan, Italy. The Duomo can be conveniently reached by metro. Simply take the metro to DUOMO station on either the yellow (M3) or red (M1) lines.

SPONSORS

Platinum Sponsors

Kinemetrics
www.kinemetrics.com

Move Solutions
www.movesolutions.it

Dewesoft
www.dewesoft.com

PCB Piezotronics
www.pcb.com

Structural Vibration Solutions
www.svibs.com

G&P intech
www.gpintech.com

S2X
www.s2x.it

Gold Sponsors

Sacertis Ingegneria
www.sacertis.com

MDPI Buildings Journal
www.mdpi.com/journal/buildings

MDPI Infrastructures Journal
www.mdpi.com/journal/infrastructures

GCF Generali Costruzioni Ferroviarie
www.generalecostruzioniferroviarie.com

HBK
www.hbkworld.com

Ommatidia
www.ommatidia-lidar.com

Silver Sponsor

Field
www.fieldsrl.it

PATRONAGES

Department of Architecture, Built Environment and Construction Engineering (DABC), Politecnico di Milano
www.dabc.polimi.it

Italian Group of IABSE
www.iabse.org/Italy

International Society for Structural Health Monitoring of Intelligent Infrastructure (ISHMII)
www.ishmii.org

Consiglio nazionale degli ingegneri (CNI)
www.cni.it

CONTACTS

Scientific Secretariat

Pier Francesco Giordano and Said Quqa

evaces2023@polimi.it

Organizational Secretariat

Giancarlo Costa

evaces2023-sec@polimi.it