17.30-19.30 **Guided City Tour**

20.30 **Social Dinner**

Thursday, September 11

9.00-9.50 **Roberto Brighenti - University of Firenze, Italy**
Modeling and testing of polymer-based piezoelectric materials.

9.50-10.40 **Alexandre Kawano - University of São Paulo, Brazil**
Unique determination of sources in a fluid-structure system.

10.40-11.10 *Break*

11.10-12.00 **Vanni Lughi - University of Trieste, Italy**
Surfaces: energy, functional modification, characterization.

12.00-12.25 **Giovanna Xotta - University of Padova, Italy**
An efficient model for multi-physics dynamics and hydraulic fracture in anisotropic porous media (part 2).

12.25-12.50 **Beatrice Pomaro - University of Padova, Italy**
Linearization approaches for stochastic dynamics analysis of systems endowed with non-integer order differential elements.

12.50 *Lunch*

ATTENDANTS

The workshop is open to anyone interested in the proposed research topics, with a particular focus on students and researchers engaged in these areas. External guests are also warmly welcomed.

ACKNOWLEDGMENTS

The organizers gratefully acknowledge the financial support from the Italian Ministry of University and Research (MUR), in the framework of PRIN2022 Project 2022JMSP2J.

The Research Unit of the University of Udine additionally thanks the financial support of the ESPeRT Project of the Polytechnic Department of Engineering and Architecture within the strategic plan of the University of Udine 2022-2025.

LECTURES

All lectures will be given in English.

REGISTRATION

Access is free; however, registration is required.
To apply, please complete the online form at:
https://cism.it/en/activities/courses/J2503/
A confirmation email will be sent to participants whose applications are accepted.

For further information please contact
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ACADEMIC YEAR 2025

International Centre for Mechanical Sciences

UNIVERSITÀ DEGLI STUDI DI TRIESTE

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WORKSHOP

STABILITY, MULTIAXIAL FATIGUE AND FATIGUE LIFE PREDICTION IN STATICS AND DYNAMICS OF INNOVATIVE STRUCTURAL AND MATERIAL COUPLED SYSTEMS

CISM-UniPD-UniTS-UniUD Joint Activity
coordinated by

Massimiliano Gei
University of Trieste, Italy

Antonino Morassi
University of Udine, Italy

Beatrice Pomaro
University of Padova, Italy

Eric Puntel
University of Udine, Italy

Udine ***September 9 - 11*** **2025**

With this workshop, we aim to engage students and researchers in civil and mechanical engineering, mathematical physics, and applied mathematics who are interested in the research themes of the PRIN project. The event will showcase the results achieved through collaborative research made possible by the project, further enriched by invited speakers who will contribute their expertise to advancing knowledge in these areas.

The research focus spans the study of the dynamics of both ordinary and complex systems, from structural and homogeneous scales down to the meso- and nano-scales, with the goal of developing rigorous mathematical and numerical models for system identification based on observed input–output data.

The main research themes explored in this project can be summarized as follows:

1. Wave propagation in metamaterials and multi-phase anisotropic materials.
2. Inverse problem techniques applied to vibration-resonant nanosensors and waveguide filters.
3. Dynamics and stability of structural systems under deterministic and stochastic excitations.

The workshop is expected to provide insights that contribute to advancements in the following areas:

- Sound control through phononic metamaterials and, more broadly, wave propagation in quasi-crystalline-based and generic anisotropic media.
- Development of reliable system identification methods applicable to nanoplate mass sensors, periodic waveguides, and bio-inspired and active materials.
- Advancement of vibration analysis techniques for structural systems, particularly in the presence of nonlinearities and random excitations.

Through interdisciplinary collaboration and knowledge exchange, this workshop aims to foster significant progress in understanding the dynamics of complex systems and the resonant properties of innovative materials, with applications in precision sensing, material diagnostics, and structural health monitoring.

Progetto ESPeRT
Energia, Sostenibilità dei Processi produttivi e Resilienza Territoriale per la Transizione Ecologica

PIANO STRATEGICO 2022-25
Decidere per il futuro

PROGRAMME

Tuesday, September 9

10.40-11.10 *Registration*

11.10-12.00 **Edi Rosset - University of Trieste, Italy**
Determining polyhedral inclusions in elastic bodies.

12.00-12.50 **Michele Brun - University of Cagliari, Italy**
Lamb waves in discrete elastic waveguides: dispersion properties, homogenisation, reciprocal and non reciprocal non-symmetric wave propagation and edge resonances.

12.50 *Lunch*

15.00-15.25 **Nico De Marchi - University of Padova, Italy**
An efficient model for multi-physics dynamics and hydraulic fracture in anisotropic porous media (part 1).

15.25-15.50 **Riccardo Fincato - University of Padova, Italy**
Numerical modeling of cyclic softening and hardening under fatigue loading.

15.50-16.40 **Luigi Cabras - University of Trieste, Italy**
A thermodynamically consistent model for solid state batteries at finite strains, inelastic response to lithium plating and stripping.

16.40-17.10 *Break*

17.10-18.00 **Marco Rossi - University of Trieste, Italy**
Transformation elastostatics in 1D domains.

18.00-18.50 **Eric Puntel - University of Udine, Italy**
An instance of surface growth: deposition in cylindrical vessels.

Wednesday, September 10

9.00-9.50 **Ramón Zaera - University Carlos III, Madrid, Spain**
The architectural wisdom of orb-web spiders.

9.50-10.40 **Giuseppe Tomassetti - University Roma Tre, Italy**
Finite-dimensional approximation of the solutions of the Fokker-Planck equation: a case study.

10.40-11.10 *Break*

11.10-12.00 **Massimiliano Gei - University of Trieste, Italy**
Canonical 1D composite waveguides: periodicity of the spectrum and topological interface modes.

12.00-12.50 **Antonino Morassi - University of Udine, Italy**
Asymmetrical spider orb webs.

12.50 *Lunch*

15.00-15.50 **Alberto Di Matteo - University of Palermo, Italy**
Tuned-liquid-column-damper based vibration energy harvesting using dielectric elastomer membranes.

15.50-16.15 **Alice Berardo - University of Padova, Italy**
Biomechanics of biological tissues: from experiments to constitutive modelling and simulation.

16.15-16.40 **Gianluca Mazzucco - University of Padova, Italy**
A visco-elasto-plasto-damage model in meso-scale approach for cementitious materials.

16.40-17.10 *Break*