**16th World Congress on Computational Mechanics and 4th Pan American Congress on Computational Mechanics**

*July 21-26, 2024, Vancouver Convention Centre, Vancouver, British Columbia, Canada*

# ADVANCED NUMERICAL METHODS FOR THE MODELING AND OPTIMIZATION OF COUPLED DYNAMICAL SYSTEMS

*Antoine Legay*[*1] and Luc Laurent[1] and Andreas Zilian[2]*

*[1]Conservatoire National des Arts et Métiers*
*[2]University of Luxembourg*

## MINISYMPOSIUM

Vibration of structures is of major importance for industrial applications. Most of the time, engineers need to control these vibrations for several reasons: comfort of users, protection of sensitive devices, fatigue of structures or energy harvesting. These vibrating structures are mostly coupled to other physics or media, leading to coupled dynamical systems. Classically, structures can be coupled to (non-exhaustive list):

- Fluids, such as for vibroacoustic problems.
- Other solid bodies, such as solids of viscoelastic or porous materials.
- Electric devices, for example through piezoelectric patches.

These couplings can involve linear or non-linear phenomena.

Engineers thus need to have both (1) predictive and (2) efficient numerical tools in order to design such systems. This is especially the case in the context of optimization, which could require numerous computations to identify optimal designs.
The aim of this mini symposium is to gather researchers from both industry and academia in order to review recent advanced developments around two key points:

1. Modeling of the involved linear or non-linear dynamical multi-physics phenomena with a seek for efficient numerical strategies using for instance reduced order models of the coupled system.
1. Achievement of optimizations in this physical framework such as parametric, shape and/or topological optimization applied on deterministic and/or stochastic context.

The scope of the mini symposium is broad, as it includes different types of multi-physics problems; analytic and numerical methodologies for the whole optimization; and application of surrogate models. Both theoretical developments and practical applications involving dynamical systems of engineering interest are particularly welcomed in this session.