

EXPERIMENTS AND MODELING OF SMART ACTIVE MATERIALS WITH ELECTRO- AND MAGNETO-MECHANICAL COUPLING

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ABSTRACT

This mini-symposium will focus on the recent research advances in experimental characterization, modelling, and simulation of coupled-field material behaviour under electric and magnetic excitation. Recent years have seen a tremendous increase in the amount of research conducted in electro- and magneto-mechanics due to application of these so-called smart materials as sensors and actuators in various engineering applications. These fast growing smart materials include magneto-rheological elastomers, electro-active polymers, ferroelectrics, dielectric elastomer composites, and multi-ferroic composite materials. The mini-symposium will cover topics including, but not limited to, multi-scale and multi-physics constitutive modelling, and material characterization at micro and macro scale, finite element

implementation. Hence, the colloquium will bring together researchers from the materials science, mechanics, mathematics, and physics communities with common interests in coupled material properties and multi-functional materials.

Possible topics:

- Experimental characterization of electro-active and magneto-active polymers.
- Modeling of electro-, magneto- and ferroelectric materials.
- Continuum models of linear and nonlinear multi-field behavior.
- Material models based on atomistic and molecular level simulation.
- Multi-scale, multi-field homogenization methods.
- Simulation-based design of multifunctional active materials systems.
- Advanced finite element formulations and implementation for electro-magneto problems.
- Instabilities in active materials.
- Nonlinear coupling strategies.
- 3D continuum and shell/beam finite elements.
- Advanced sensing/actuation mechanisms.
- Large scale engineering applications such as MRI scanners.

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