Multiscale and Multiphysics Modelling for Complex Materials (MMCM5)

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Abstract

This symposium will provide a forum to present and debate multiscale and multiphysics methodologies for studying the behaviour of complex materials.
The goal is to bring together researchers (engineers, physicists, mathematicians) specializing in multiscale and multiphysics modelling and simulation of complex materials. Mechanics will play a central role, but the focus will be set on those problems where mechanics is highly coupled with other concurrent physical phenomena. In this framework, the interest and suitability of multiscale strategies will be highlighted.
This symposium is intended to be a computational-oriented follow-up of the successful MCM symposia previously held in Vancouver (Thermech 2006), Berlin (Thermech 2009) and Paris (ECCM 2010), Wien (6[th]ECCOMAS 2012).
The focus will be set on computational issues, while still highlighting the underlying conceptual and theoretical basis.
With these aims in mind, contributions from all aspects of engineering applications, with particular attention to structural engineering applications, will be considered. Topics of applications will include (but not be limited to):

Materials with micro(/nano)-structure
· Composites, Fibre-Reinforced, Laminated
· Granular, Masonry-Like, Cementicious
· Biomaterials
· Random Materials
· Shape-Memory Alloys

Complex material behaviour
· Damage, Fracture, Defects, Cracks
· Poromechanics, Fluid Flow
· Thermomechanics, Viscosity
· Randomness and Fractals

Non-standard/Non-local continuous formulations
· Micromorphic continua
· Multifield, Configurational/Material Forces descriptions
· Non-local models
· Dispersive Wave Propagation

Computational Methods
· Coupled Discrete-Continuum Methods
· Homogenization Methods
· Computational Multiscale Methods
· Non-standard Methods for Generalized Continua
· Molecular, Dislocation Dynamics, Distinct Elements Methods
· Object-oriented, Adaptive Homogenization