8th. World Congress on Computational Mechanics (WCCM8)
5th. European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2008)
June 30 – July 5, 2008
Venice, Italy

MULTISCALE MODELING AND UNCERTAINTY QUANTIFICATION OF HETEROGENEOUS MATERIALS

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Key words: Multiscale Modeling, Uncertainty Quantification, Heterogeneous Materials, Random Field Simulation.

ABSTRACT

Over the last few years the use of computational stochastic methods in a multiscale setting for uncertainty quantification and reliability analysis of heterogeneous materials has been arising as an emerging research frontier. Translation of deterministic multiscale methods into corresponding stochastic versions requires not only development of highly efficient stochastic algorithms to deal with the "curse of dimension" problem, but also knowledge of multiscale probabilistic characteristics of complex material systems. Specifically, it is the emergence of new advanced heterogeneous materials that makes imperative the need of accurate stochastic modeling across multiple length scales. Equally important is to ensure the link between stochastic models and physical realities by establishing a connection of probabilistic methods to fundamental materials science and experimental mechanics.

The scope of this Mini-Symposium is to bring together scientists and engineers seeking interactions among stochastic material models, multiscale mechanics and uncertainty quantification in order to improve the safety and reliability of engineering material systems. Papers on multiscale methods involving uncertainties, stochastic modeling of multiscale materials, random field simulation and/or characterization of complex material systems, and validation of stochastic modeling techniques are equally welcome for presentation in this Mini-Symposium.