# COMPUTATIONAL MODELS FOR STOCHASTIC MULTISCALE SYSTEMS[1]

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ABSTRACT

In the first part of the presentation we will discuss the development and implementation of stochastic methods for multiscale continuum systems. Two separate stochastic modeling approaches viz. generalized polynomial chaos and a novel support-space approach will be considered in the context of variational multiscale methods. In the former, any stochastic quantity is represented as a sum of its projections on the Askey basis spanning the input probability space. In the latter, a random output is represented in a piecewise finite element representation in the input support space (regions with positive input joint probability distribution). Examples will be presented in a variety of applications including the solution of stochastic elliptic equations with multiscale coefficients using a localized stochastic subgrid problem.

In the second part of the presentation we will briefly introduce several stochastic multiscale problems that naturally arise in the modeling and robust design of polycrystal materials. They will include information-theoretic approaches for property prediction of random microstructures, stochastic homogenization techniques, non-intrusive robust design techniques and other.

[1] Invited presentation at the`` Numerics for Stochastic Differential Equations with Applications" symposium at the School of Computational Science (SCS), Florida State University (M. Gunzburger et al. organizers), Tallahassee, Florida, February 26 - March 2, 2006.