



Arthur Imperatore School of Sciences and Arts

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Department of Mathematical Sciences  
Stevens Institute of Technology

Dr. X. Frank Xu

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*Stochastic Processes/Random Fields Theory  
and Stochastic Mechanics Research*

Tuesday, March 28, 2006  
4:00 pm  
Peirce 220

*Abstract:*

This talk will give an introduction of recent stochastic mechanics research in materials and multi-scale modeling. Current stochastic mechanics research are focused on two areas - morphological simulation and stochastic partial differential equations. First morphological simulation will be addressed with a new higher-order correlation model using Markov/Gibbs random field theory and Metropolis algorithm. Then numerical approaches for stochastic PDEs will be presented with Karhunen-Loeve expansion, polynomial chaos expansion, and stochastic Galerkin formulation. Finally several severe challenges confronting engineers and mathematicians in the relevant fields will be summarized.

*Bio:*

Dr. X. Frank Xu is presently an assistant professor in mechanics/materials/computation at the Department of Civil, Environmental and Ocean Engineering, Stevens Institute of Technology. Dr. Xu's current research is focused on stochastic mechanics, computational multiscale modeling, and micro/nano heterogeneous materials. The areas of expertise applied in his research include multiscale stochastic finite element methods, homogenization theory, computational stochastic mechanics, reliability and security of structural/material systems, simulation of random fields and stochastic processes, morphological characterization and optimization, and advanced materials for innovative structural applications. Dr. Xu's research aims to develop innovative models for multiscale materials from perspectives of both morphologies and mechanics. His recent work includes proposing of two innovative multiscale methods - the multiscale stochastic finite element method and numerical stochastic homogenization method. Dr. Xu received his B.E. degree from Tsinghua University in 1993, and a doctorate in Civil Engineering from The Johns Hopkins University in 2005.

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Refreshments will be provided.

For more information contact Darinka Dentcheva, Michael Zabarankin, Ionut Florescu, or call 201-216-5449.