

Computing@PNNL SEMINAR

A Class of HPCC Framework for Uncertainty and Sensitivity Analysis

Devan Ganesh, Ph.D.

Professor, College of Engineering & Computational Sciences,
Department of Applied Mathematics & Statistics/Computer
Science Department (Joint Faculty)
Colorado School of Mines



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In his talk, Professor Ganesh will consider a class of wave propagation models with aleatoric and epistemic uncertainties. Using mathematically robust parameter estimates, he will describe the development of high performance and cloud computing (HPCC) offline/online strategies to compute statistical moments of a key quantity of interest in such models. The HPCC framework is based on an offline/online reduced order model (ROM) for efficiently quantifying aleatoric and epistemic uncertainties in the propagation of waves through a stochastic medium comprising a large number of three-dimensional particles. Such simulations, even for a single deterministic 3D configuration, are inherently difficult because of the large number of parameters describing the medium. The aleatoric uncertainty in the model leads to a larger dimensional system that involves three spatial variables and additional stochastic variables. Accounting for epistemic uncertainty in key parameters of the input probability distributions leads to prohibitive computational complexity. The HPCC framework, a hybrid of ROM and HPC, can be used in conjunction with any computational method to simulate a single particle deterministic wave propagation model.