

Stochastic, computational statistics and statistical learning techniques* for multiscale modeling of continuum systems

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We will very briefly discuss the role that stochastic modeling, Bayesian computation and statistical learning techniques can play in the analysis and design of multiscale continuum systems. Topics to be highlighted include:

- The variational multiscale approach with subgrid scale modeling for stochastic thermal/flow transport systems.
- Uncertainty propagation in the deformation of polycrystal materials.
- Bayesian statistical inference and advanced simulation techniques for multiscale and multiphysics transport phenomena in porous media.
- Statistical (machine) learning techniques for modeling/design of materials across length scales and for real time decision and control using microstructural features.

* Invited lecture at the 3rd Department of Energy Multiscale Mathematics Workshop (organizers: Dr. M. A. Khaleel, Prof. J. Dolbow, Prof. J. Mitchell), Portland Marriott, Portland, Oregon, September 21-23, 2004.