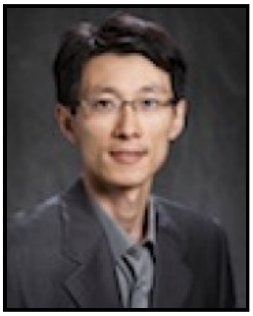

Computational Mathematics Seminar Series

On Small Random Perturbations of Elliptic Problems

Xiaoliang Wan, Louisiana State University

Associate Professor, Department of Mathematics

Digital Media Center 1034
October 11, 2016 - 03:30 pm

Abstract:
The large deviation principle (LDP) plays an important role for studying rare events induced by small random noise. One challenging task of applying the LDP is to minimize the rate functional numerically, especially when a spatially extended system is considered. Many numerical issues arise depending on the properties of the system and the noise. In this talk we discuss the regularization for the spatial covariance operator using Poisson's equation perturbed by small random forcing. The Euler-Lagrange (E-L) equation suggests that it is critical to approximate a nonlocal biharmonic-like operator, which is ill-posed due to the inverse of the covariance operator. We first study the properties of the nonlocal biharmonic-like operator and then consider the Lavrentiev regularization. The convergence of the approximated minimizer is established in terms of Gamma-convergence. Furthermore, we construct an LDP-based importance sampling estimator, and provide a sufficient condition for such an estimator to be asymptotically efficient. The effect of the regularization parameter on the importance sampling estimator is studied numerically.

Speaker's Bio:

Xiaoliang Wan is an associate professor in the Department of Mathematics and CCT. He received his PhD from Brown University in 2007. Prior to joining the LSU faculty, he was a postdoctoral research associate at Princeton University. His research interests include stochastic modelling, numerical methods for (stochastic) PDEs, adaptivity in numerical simulations and minimum action methods.

This lecture has a reception @ 03:00 pm

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