



The University of Chicago  
Department of Statistics

SPECIAL STATISTICS COLLOQUIUM

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**DONALD ESTEP**

Center for Interdisciplinary Mathematics and Statistics  
Colorado State University

**Efficient Approximation, Error Estimation, and  
Adaptive Computation for Randomly Perturbed  
Elliptic Problems**

**TUESDAY, November 15, 2011, at 4:00 PM**

**206 Eckhart Hall**, 5734 S. University Avenue

*Refreshments following the seminar in Eckhart 110.*

**ABSTRACT**

We consider the problem of approximating the probability distribution for a quantity of interest computed from the solution of an elliptic problem with a randomly perturbed diffusion coefficient. We model the uncertainty using a piecewise representation that is suited to situations in which there is limited experimental data and to a common technique in multi-scale modeling. By applying nonoverlapping domain decomposition and the Neumann series to the finite element method, we derive a method to compute an approximate distribution in which the cost grows very mildly with the number of samples. We briefly discuss the convergence and then describe an a posteriori error estimate for the computed distribution that takes into account all sources of deterministic and stochastic errors. Finally, we use the estimate to derive an adaptive method for achieving a desired accuracy in the computed distribution by an efficient division of computational resources.

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<https://lists.uchicago.edu/web/arc/statseminars>.