
Hillary Fairbanks
**High Dimensional Uncertainty Quantification via
Multilevel Monte Carlo**

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Multilevel Monte Carlo (MLMC) has been shown to be a cost effective way to compute moments of desired quantities of interest in stochastic partial differential equations when the uncertainty in the data is high-dimensional. In this talk, we investigate the improved performance of MLMC versus standard Monte Carlo. While both methods converge at a rate independent of the dimension of the stochastic input, the use of a series of nested grids in MLMC allows us to improve the convergence by allocating more computational work onto the coarse grids, while the costly fine grid solves require fewer samples. In addition, we find that further variance reduction techniques have promise in speeding up convergence to a solution. As an application, we consider a thermally driven flow problem with random fluctuations in temperature along one wall of a square domain. Given the random input of the initial temperature, we wish to determine the expected value of the final mean heat flux along the opposite wall.