Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Error estimation and adaptivity for transport problems with uncertain parameters[1] ONKAR SAHNI, JASON LI, ASSAD OBERAI, MANE, RPI — Stochastic partial differential equations (PDEs) with uncertain parameters and source terms arise in many transport problems. In this study, we develop and apply an adaptive approach based on the variational multiscale (VMS) formulation for discretizing stochastic PDEs. In this approach we employ finite elements in the physical domain and generalize polynomial chaos based spectral basis in the stochastic domain. We demonstrate our approach on non-trivial transport problems where the uncertain parameters are such that the advective and diffusive regimes are spanned in the stochastic domain. We show that the proposed method is effective as a local error estimator in quantifying the element-wise error and in driving adaptivity in the physical and stochastic domains. We will also indicate how this approach may be extended to the Navier-Stokes equations.

[1]NSF Award 1350454 (CAREER)

Onkar Sahni
MANE, RPI

Date submitted: 01 Aug 2016 Electronic form version 1.4