Numerical Analysis and Scientific Computing Seminar

Multilevel Monte Carlo simulations with algebraically constructed coarse spaces

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Abstract: We consider the numerical simulation of multiscale multiphysics phenomena with uncertain input data in a Multilevel Monte Carlo (MLMC) framework. Multilevel Monte Carlo techniques typically rely on the existence of hierarchies of computational meshes obtained by successive refinement. We apply MLMC to unstructured meshes by using specialized element-based agglomeration techniques that allow us to construct hierarchies of coarse spaces that possess stability and approximation properties for wide classes of PDEs. An application to subsurface flow simulation in mixed finite element setting illustrates our approach. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344

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