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Computational Mathematics Seminar Series

Localized Orthogonal Decomposition Method with Additive Schwarz for the Solution of Multiscale Elliptic Problems

Jose Garay, Louisiana State University

Postdoctoral Researcher

Digital Media Center 1034
November 05, 2019 - 03:30 pm

Abstract:

The solution of elliptic Partial Differential Equations (PDEs) with multiscale diffusion coefficients using regular Finite Element methods (FEM) typically requires a very fine mesh to resolve the small scales, which might be unfeasible. The use of generalized finite elements such as in the method of Localized Orthogonal Decomposition (LOD) requires a coarser mesh to obtain an approximation of the solution with similar accuracy. We present a solver for multiscale elliptic PDEs based on a variant of the LOD method. The resulting multiscale linear system is solved by using a two-level additive Schwarz preconditioner. We provide an analysis of the condition number of the preconditioned system as well as the numerical results which validate our theoretical results.

Speaker's Bio:

Jose Garay is a Postdoctoral Researcher at the Center for Computation & Technology at Louisiana State University. He obtained a bachelor's degree in Electronics Engineering from the Universidad Nacional de Asunción in Paraguay. Later he received a Ph.D. degree in Mathematics from Temple University. His Ph.D. thesis research focused on asynchronous domain decomposition methods. His research interests include Numerical Analysis in general and Numerical Linear Algebra in particular, Domain Decomposition Methods, Asynchronous Algorithms, High Performance Computing and Multiscale Problems.

This lecture has refreshments @ 03:00 pm