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Computational Mathematics Seminar Series

DD-LOD: A Localized Orthogonal Decomposition Method for Elliptic Problems with Rough Coefficients Based on Domain Decomposition Techniques.**José Garay, Louisiana State University**

Postdoctoral Researcher

Digital Media Center 1034
November 29, 2022 - 03:30 pm**Abstract:**

The solution of multi-scale elliptic problems with non-separable scales and high contrast in the coefficients by standard Finite Element Methods (FEM) is typically prohibitively expensive since it requires the resolution of all characteristic lengths to produce an accurate solution. Numerical homogenization methods such as Localized Orthogonal Decomposition (LOD) methods provide access to feasible and reliable simulations of such multi-scale problems.

These methods are based on the idea of a generalized finite element space whose basis functions are obtained by modifying standard coarse standard FEM basis functions to incorporate relevant microscopic information in a computationally feasible procedure. Using this enhanced basis one can solve a much smaller problem to produce an approximate solution whose accuracy is comparable to the solution obtained by the expensive standard FEM. We present a variant of the LOD method that utilizes domain decomposition techniques and its applications in the solution of elliptic partial differential equations with rough coefficients as well as elliptic optimal control problems with rough coefficients with and without control constraints.

Speaker's Bio:

José Garay is a Postdoctoral Researcher at the Center for Computation & Technology at Louisiana State University. He received his Ph.D. degree in Mathematics from Temple University. His research interests include multi-scale finite element methods, domain decomposition methods, numerical linear algebra, and asynchronous methods, from the theoretical and implementation points of view.

