

Department of Applied and Computational Mathematics and Statistics Colloquium



Lin Mu

Computer Science & Mathematics
Division
Oak Ridge National Laboratory

Numerical Analysis, Implementations, and Applications of Advanced Finite Element Methods

In this talk, the speaker will discuss the numerical analysis and application of advanced finite element methods in the numerical simulation of fusion plasma physics models.

The first part focuses on the application of full kinetic modeling. Due to the high dimensionality (6D+time) of the problem, the design of stable and efficient numerical scheme for the simulation, which retains conservation properties, is challenging and absolutely necessary. Sparse grids methods are a powerful tool for reducing the DoF requirement while maintaining the same accuracy. The speaker will present the implementation detail of low-cost sparse grid methods. The second part will focus on the error estimate of the weak Galerkin finite element method (WGFEM) for elliptic problems. WGFEM is a general framework for solving PDEs on polygonal meshes. The speaker will analyze its asymptotic behavior of convergence. Furthermore, a fully computable error estimator will be constructed and employed to guide the mesh refinement in an adaptive procedure. Numerical examples will be presented to demonstrate the reliability and efficiency of WGFEM.

Monday, January 14, 2019

4:15 PM – 5:15 PM

127 Hayes-Healy Center

Colloquium Tea 3:45 PM to 4:15 PM 101A Crowley Commons Room