

MATH DEPARTMENT COLLOQUIUM



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11:00 AM-noon
DERR 330

Finite Element Approximations of Singularities

First, we review the finite element formulation in a general mathematical setting. Then, we discuss recent advances in the development of effective finite element algorithms approximating a class of singular solutions, including corner singularities with different boundary conditions and singularities from the non-smooth points on the interface in transmission problems. We establish a-priori estimates (well-posedness, regularity, and the Fredholm property) for the singular solution in weighted Sobolev spaces. Then, based on these theoretical results, we propose a simple and explicit construction of the finite element space to recover the optimal convergence rate of the numerical solution. We also mention applications in physics and engineering.

Hengguang Li obtained B.S. in computational mathematics from Peking University in 2002. He obtained his Ph.D. in mathematics and minor in high performance computing from the Pennsylvania State University in 2008. He is currently an Associate Professor of the department of mathematics, Wayne State University.