

Discrete Mathematics Seminar

Time: Friday, 20 September 2013, 1:00-2:00 PM
Room: 238 Derrick Hall
Title: A SCALABLE AUXILIARY SPACE PRECONDITIONER FOR HIGHER-ORDER FINITE ELEMENT METHODS
Speaker: Dr. Young Ju Lee, Mathematics Department

Abstract:

In this talk, we revisit an auxiliary space preconditioning method proposed by Xu [Computing 56, 1996], in which low-order finite element spaces are employed as auxiliary spaces for solving linear algebraic systems arising from higher-order finite element discretizations. We provide a new convergence rate estimate and parallel implementation of the proposed algorithm. We show that this method is user-friendly and can play an important role in a variety of Poisson-based solvers for more challenging problems such as the Navier-Stokes equation. We investigate the performance of the proposed algorithm using the Poisson equation and the Stokes equation on 3D unstructured grids. Numerical results demonstrate the advantages of the proposed algorithm in terms of efficiency, robustness, and parallel scalability.