Discrete Mathematics Seminar

Time: Friday, 13 November 2015, 2:15-3:15 PM
Room: 237 Derrick Hall
Title: A Locally Conservative Enriched Galerkin Approximation and User-Friendly
            Efficient Solver for Elliptic and Parabolic Problems
Speaker: Dr. Sanghyun Lee, The Center for Subsurface Modeling
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Abstract:

We present and analyze an enriched Galerkin finite element method (EG) to solve elliptic and parabolic equations with jump coefficients.

The EG is formulated by enriching the conforming continuous Galerkin finite element method (CG) with the piecewise constant functions, which can be considered as an additional penalty stabilization. The method is shown to be locally and globally conservative, while keeping lower degree of freedoms in comparisons with discontinuous Galerkin finite element methods (DG). Moreover, we present and analyze a fast, effective and user-friendly EG solver simpler than DG and whose cost is roughly that of CG and can handle {an arbitrary} order of approximations. A number of numerical tests in two and three dimensions are presented to confirm our theoretical results as well as to demonstrate the advantages of the EG when coupled with transport. This is the joint work with Professor Lee (Texas State) and Professor Wheeler (ICES, UT Austin).