Department of Mathematics

University of Houston

## Scientific Computing Seminar

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## Five Trends in the Mathematical Foundation of Computational PDEs

Thursday, Sep. 6, 2012 3:00 PM- 4:00 PM Room 646 PGH

## Abstract:

This presentation concerns five topics in computational partial differential equations with the overall goals of reliable error control and efficient simulation. The presentation is also an advertisement for nonstandard discretisations in linear and nonlinear Computational PDEs with surprising advantages over conforming finite element schemes and the combination of the two. The equivalence of various first-order methods is explained for the linear Poisson model problem with conforming (CFEM), nonconforming (NC-FEM), and mixed finite element methods (MFEM) and others discontinuous Galerkin finite element (dGFEM). The Stokes equations illustrate the NCFEM and the pseudo-stress MFEM and optimal convergence of adaptive mesh-refining as well as for guaranteed error bounds. An optimal adaptive CFEM computation of elliptic eigenvalue problems and the computation of guaranteed upper and lower eigenvalue bounds based on NCFEM. The obstacle problem and its guaranteed error control follows another look due to D. Braess with guaranteed error bounds and their effectivity indices between 1 and 3. Some remarks on computational microstructures with degenerate convex minimisation problems conclude the presentation.

This seminar is easily accessible to persons with disabilities. For more information or for assistance, please contact the Mathematics Department at 743-3500.