Department of Mathematics

University of Houston

## Scientific Computing Seminar

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## Stable Generalized Finite Element Method

Thursday, March 29, 2012 3:00 PM- 4:00 PM Room 646 PGH

## Abstract:

It is well known that the implementation of the standard Finite Element Method (FEM) to approximate solutions of problems with special features, e.g., crack-propagation problems, interface problems, problems with microstructures etc., requires a lot of extra effort. The Generalized Finite Element Method (GFEM) has been successfully used to approximate the solutions of such problems. The success of GFEM is due to the use of a special trial space, which is the trial space of the standard FEM augmented with non-polynomial shape functions of compact support. The associated shape functions mimic the local behavior of the unknown solution of the underlying PDE. The GFEM is extremely flexible and has excellent approximation properties. However, the stiffness matrix of the GFEM is badly conditioned – much worse than that of the FEM. In this talk, we will address this issue by suggesting a modification of the GFEM retains the excellent approximation properties of GFEM, and the conditioning of the SGFEM is not worse than the conditioning of the standard FEM. Moreover, SGFEM is robust with respect to certain parameters. We will also give a brief overview of GFEM in this talk.

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