

Department of Mathematics

University of Houston

## Scientific Computing Seminar

Prof. Jinchao Xu

Department of Mathematics

Pennsylvania State University

## Numerical Methods for Multi-Physics Problems

Thursday, December 19, 2013

3:00 PM- 4:00 PM

Room 646 PGH

### **Abstract:**

In this talk, I will report some recent results on the integrated study of robust discretization and efficient solver for multi-physics problems including fluid-structure interactions (FSI). For an FSI model problem, as an example, we observe that a straightforward finite element discretization based on an ALE formulation, as often used in most existing literature, leads to a discretized system that is not uniformly (with respect material and mesh parameters) stable. To correct this hidden instability, we introduce a stabilization technique and then theoretically establish the uniform wellposed-ness of the stabilized model under appropriate assumptions. This uniform stability makes it possible to design a robust monolithic preconditioner for the coupled FSI discrete system. Numerical examples are used to show the robustness and efficiency of the pre conditioners.

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