

Department of Mathematics

University of Houston

## Scientific Computing Seminar

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### Domain decomposition methods for coupled flow and mechanics problems

Thursday, March 20, 2014

1:30 PM- 2:30 PM

Room 646 PGH

**Abstract:** We discuss a computational framework for modeling multiphysics systems of coupled flow and mechanics problems. The approach is based on a multiblock domain decomposition methodology. The simulation domain is decomposed into a union of subdomains, each one associated with a physical, mathematical, and numerical model. Physically meaningful interface conditions are imposed on the discrete level via mortar finite elements or Nitsche's coupling. The formulation provides great flexibility for multiphysics and multinumerics couplings. The domain decomposition approach, combined with coarse scale mortar elements, provides a multiscale approximation and an efficient way to solve the coarse grid problem in parallel. We discuss three applications of the framework: 1) Stokes-Darcy flows, 2) domain decomposition for elasticity, and 3) time-partitioning non-iterative schemes for coupled fluid flow with poroelastic structure. Applications to flows in fractured deformable reservoirs and arterial flows are presented.

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