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Computational Mathematics Seminar Series

## Monolithically Coupled Scalable Parallel Algorithms for Simulation of Fluid-structure Interaction

**Andrew Barker, Louisiana State University**

Johnston Hall 338
September 01, 2009 - 03:10 pm

**Abstract:**
Simulation of fluid-structure interaction is a computationally difficult problem that is important in a variety of applications. Doing it well requires not only accurately modeling physics for the fluid and the structure, but also coupling them together in a stable and efficient manner, and developing scalable numerical methods for this highly nonlinear problem is a challenge. In this talk we describe and examine parallel, scalable techniques in the multilevel Newton-Krylov-Schwarz family for solving the fully implicit fluid-structure interaction system on dynamic unstructured moving finite element meshes in the arbitrary Lagrangian-Eulerian framework. Our emphasis is on tight monolithic coupling of the physical systems and the computational mesh, and on the parallel scalability of the method. We present applications of the method to the simulation of blood flow on vessel geometries derived from patient-specific clinical data.

**Speaker's Bio:**
Andrew T. Barker is a VIGRE postdoc working with Susanne Brenner in the math department and at the CCT at LSU. He completed his PhD in Applied Mathematics at the University of Colorado, Boulder under Xiao-Chuan Cai with a thesis in numerical analysis and parallel computation, with a specific focus on the simulation of blood flow in human arteries.

**This lecture has a reception.**