**COLLOQUIUM**

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“Fast Iterative Solvers for the

Navier-Stokes Equations”

Thursday, February 19, 2009 at 3:30 p.m. in CH 025

Refreshments will be served in Math 238 at 3:00 p.m.

**Abstract**

I will present recent work on iterative solvers for various discretizations of the incompressible Navier-Stokes equations, for both steady and unsteady flow cases. Although Picard linearization is used, many of the techniques and results are applicable to Newton linearization as well.

The talk will focus on two classes of methods:

1) Coupled multigrid methods, with a focus on new smoothers;

2) Block triangular preconditioners for Krylov subspace methods.

More specifically, I will discuss the use of the Hermitian and skew-Hermitian splitting iteration as a smoother in a coupled multigrid method, as well as new preconditioners and a multigrid method for augmented Lagrangian formulations of the linearized Navier-Stokes equations.

I will examine the performance of various solvers as the mesh size, Reynolds number, time step, and other problem parameters vary. Local Fourier analysis and extensive numerical tests indicate that fast convergence is achieved in many cases, with very weak dependence on problem parameters.

This is joint work with my students, Steven Hamilton and Zhen Wang.