Department of Mathematics

University of Houston

## Scientific Computing Seminar

Abigail Bowers Department of Mathematical Sciences Clemson university

## Numerical study of a regularization model for incompressible flow with adaptive nonlinear filtering

Thursday, October 24, 2013 3:00 PM- 4:00 PM Room 646 PGH

**Abstract:** We study adaptive nonlinear filtering in the regularization models for incompressible, viscous Newtonian flow. The filtering radius is locally adjusted using an indicator function so that resolved flow regions and coherent flow structures are not filtered-out, which is a common problem with these types of models. A numerical method is proposed for the models that is unconditionally stable with respect to timestep, and decouples the problem. We devise several indicator functions based on physical phenomenology and provide numerical examples that demonstrate their effectiveness. We then examine a deconvolution-based indicator function, which allows us to establish a rigorous analysis of the resulting numerical algorithm. We prove well-posedness, unconditional stability, and convergence of the proposed algorithm, and test the model on several benchmark problems.

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