Meeting: 1003, Atlanta, Georgia, SS 27A, AMS-SIAM Special Session on Analysis and Applications in Nonlinear Partial Differential Equations, I

1003-35-1539 **Diane L Denny*** (ddenny@uwyo.edu), Department of Mathematics, University of Wyoming, Laramie, WY 82071. *Global existence and uniqueness of solutions to nonlinear equations modeling the low-speed flow of an incompressible, barotropic fluid.* Preliminary report.

We consider a system of nonlinear partial differential equations modeling the low-speed flow of an incompressible, barotropic fluid in 2 or 3 spatial dimensions, either with or without viscosity. The system consists of the momentum equation, the equation div(v)=0, and the equation of state for the pressure as a function of the density. We prove the existence of a unique, global-in-time, classical solution to these equations for the case of periodic boundary conditions and small initial data. The method of proof can also be applied to other types of boundary conditions. The key to the proof is a new L2 estimate for the density. (Received October 05, 2004)