1026-35-2 **Natasa Pavlovic***, Princeton University. *The enigma of the equations of fluid motion: A survey of existence and regularity results.*

The partial differential equations that describe the most crucial properties of the fluid motion are the Euler equations. They are derived for an incompressible, inviscid fluid with constant density. Some basic questions concerning Euler equations in 3 dimensions are still unanswered. For example, it is an outstanding problem to find out if solutions of the 3D Euler equations form singularities in finite time.

The equations that describe the most fundamental properties of viscous fluids are the Navier-Stokes equations. As with the Euler equations the theory of the Navier-Stokes equations in 3D is far from being complete. The major open problems are global existence, uniqueness and regularity of smooth solutions of the Navier-Stokes equations in 3D.

In this talk we will give a survey of some known results addressing existence and regularity of solutions to these equations. (Received March 29, 2006)