1060-76-20 **John F. Gibson*** (johnfgibson@gmail.com), School of Physics, 837 State St, Georgia Institute of Technology, Atlanta, GA 30332-0430, and **Predrag Cvitanović** (predrag.cvitanovic@physics.gatech.edu), School of Physics, 837 State St, Georgia Institute of Technology, Atlanta, GA 30332-0430. *Invariant solutions and state-space dynamics of low-Reynolds turbulence.*

It has recently become possible to compute precise 3D, nonlinear solutions of Navier-Stokes equations at Reynolds numbers above the onset of turbulence, for simple geometries such as pipes and channels. These solutions capture the form and dynamics of "coherent structures" and provide a starting point for understanding low-Reynolds turbulence as a dynamical system. In this talk I will present a number of equilibrium, traveling wave, and periodic orbit solutions of plane Couette flow, emphasizing visualizations of their physical structure and state-space dynamics, and comparisons to turbulent flow. Certain spatially localized solutions exhibit homoclinic snaking remarkably similar to that observed in simpler 1D PDE systems such as the Swift-Hohenberg equation. What emerges is a picture of low-Reynolds turbulence as a walk among a set of weakly unstable invariant solutions. (Received January 21, 2010)