Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Exact coherent structures in 2D weakly turbulent flow ROMAN GRIGORIEV, RAVI PALLANTLA, Georgia Institute of Technology — The description of fluid dynamics in terms of exact coherent structures (ECS) has recently emerged as a promising approach to a deterministic description of weak turbulence. Each ECS corresponds to an exact regular unstable solution of the Navier-Stokes equation and turbulence can be thought of as a walk through neighborhoods of a set of ECS. Although many ECS of different types have been identified numerically for a variety of experimentally realizable 3D flows (e.g., pipe Pouseuille and plane Couette flows), none have been verified to exist in experiment, in part due to the practical difficulties with setting up the appropriate initial conditions. In this talk we discuss numerically computed ECS in a model of a 2D Lorentz force-driven flow in a thin layer of electrolyte, which should be much easier to compare with experiment due to the relative ease with which 2D flow can be manipulation and observed. Special attention is given to enforcing physical boundary conditions and the choice of protocols that can be used in experiment to reproduce unstable flows corresponding to computed ECS.

Roman Grigoriev
Georgia Institute of Technology

Date submitted: 01 Aug 2013 Electronic form version 1.4