Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Developing Experiment-based Dynamical Systems of the Axisymmetric Jet. JEREMY PINIER, MARK GLAUSER, Syracuse University, WILLIAM GEORGE, Chalmers University of Technology — With the aim of implementing closed-loop control on the flow exiting an axisymmetric jet nozzle, and to be able to capture the dynamics of the flow as it evolves downstream of the jet exit, we are developing dynamical systems based on the Navier-Stokes equations. The evolution equation is guided by a Galerkin projection of the Navier-Stokes equations onto the Proper Orthogonal Decomposition (POD) eigenfunctions. The coefficients of the ordinary differential equations for each streamwise position are then solved for using experimental data of the flow based on the moments method initially developed by the Poitiers group. A time-prediction of the evolution of the flow can then be retrieved from given initial conditions. The main experimental limitation lies in acquiring time-resolved data of the flow which is needed in the resolution of the dynamical system. The progress in the effort of training the dynamical system with time-resolved data of the jet and its implementation for control will be discussed.

Mark Glauser
Syracuse University

Date submitted: 11 Aug 2005 Electronic form version 1.4