Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

MHD simulations and theory for sheared flows and turbulence in the Helimak[1] R. DAHLBURG, Naval Research Laboratory, W. HORTON, J.C. PEREZ, K. GENTLE, The University of Texas at Austin — The Helimak experiment was designed to study the interaction between sheared mass flows and ambient turbulence in a confined plasma. The experiment is well modeled by the classical slab used in theoretical analysis of flows and turbulence in tokamaks and channel flows. We report results of numerical simulations and theory for a magnetohydrodynamic slab model of the Helimak, using magnetic and flow profiles based on experimental data. Important features of the model include the three spatial dimensions, the presence of walls, and the inclusion of resistivity and viscosity. Linear results, computed with a Chebyshev-τ algorithm, indicate the existence of traveling unstable disturbances. We analyze the linear results by examining the stresses and perturbed dissipation. We also report progress on nonlinear simulations using our new Chebyshev-collocation–Fourier-pseudospectral code. Preliminary results show that as the linear modes attain finite amplitude, there is considerable development of multiscale plasma excitation.

[1]This work was supported by the Naval Research Laboratory and the Department of Energy.

Wendell Horton
Institute for Fusion Studies, UT-Austin

Date submitted: 19 Jul 2005 Electronic form version 1.4