Category Number and Subject:

[**X**] Theory   [ ] Experiment

Steady-State Flows in Two-Fluid Models of NSTX and DIII-D Plasmas,* N.M. Ferraro, ORISE-GA, S.C. Jardin, J. Chen, PPPL – Accurate axisymmetric steady-states of a comprehensive two-fluid model are calculated for plasmas in diverted NSTX and DIII-D geometries using the M3D-C^1 code [1]. It is found that gyroviscosity may have a significant effect on the flows in steady-state when a localized density source is present. The model implemented in M3D-C^1 self-consistently includes the effects of flows, anisotropic viscosity, anisotropic thermal conductivity, and resistivity. Results for ohmically driven plasmas are presented. New capabilities of M3D-C^1 allow the three-dimensional linear stability of axisymmetric equilibria to be calculated; these capabilities and preliminary stability results are discussed. Also discussed are recent and future extensions to M3D-C^1, including heuristic bootstrap current models, coupling to a physics-based transport model, and nonlinear non-axisymmetric capability.

[1] S. C. Jardin, J. Breslau, N. Ferraro, J. Comput. Phys, 226 (2007) 2146