Numerical Studies of Two-Fluid Axisymmetric Steady-States with Flow in Ohmic NSTX-like Plasmas[1] NATHANIEL FERRARO, STEPHEN JARDIN, Princeton Plasma Physics Laboratory — Axisymmetric steady-states of the resistive two-fluid equations, including flow and gyroviscosity, are obtained by evolving these nonlinear equations from an initial ideal MHD equilibrium using the code M3D-C^1 [1], which has now been extended to toroidal geometry. Steady-states for high-β, inductively driven discharges in diverted NSTX geometries are studied. Excellent agreement with theoretical predictions of cross-surface Pfirsch-Schlüter flows in the axisymmetric steady-states is found. The dependence of flow velocities with resistivity is explored. It is found that in the two-fluid model, the statistical steady-state may be a fixed point, a limit cycle, or chaotic, depending on the parameters. Two-fluid terms lead to a preferred direction of toroidal rotation. The inclusion of gyroviscosity is observed to alter the character of the steady-state. The three-dimensional linear stability of simple equilibria in this two-fluid model are also explored using M3D-C^1 [2]. [1] N. Ferraro, S. Jardin. Phys. Plasmas **13**:092101 (2006). [2] S. Jardin, N. Ferraro, J. Breslau, J. Chen, and M. Chance. Initial results for linear 3D Toroidal Two-Fluid stability using M3D-C1. APS DPP Conference, Dallas, TX (2008).

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