Abstract Submitted
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Validation of 2-Fluid and Gyro-Viscous Terms in Nimrod[1] D.D. SCHNACK, University of Wisconsin, D.C. BARNES, University of Colorado, D.P. BRENNAN, University of Tulsa, A.Y. PANKIN, Lehigh University, C.R. SOVINEC, University of Wisconsin, NIMROD TEAM — Drift effects in modern tokamak plasmas can cause stabilization of modes that are otherwise unstable within the resistive MHD model. In the context of fluid modeling, these effects appear as additional terms in the ion and electron momentum equations. These terms account for the fact that ions and electrons flow as distinct and separate fluids (diamagnetic and polarization drifts), and that the small but finite size of the ion gyro-radius can cause a reversible (non-dissipative) flux of fluid momentum (FLR, or gyro-viscous effects). It is well known [1] that these effects become stabilizing for interchange instabilities when $\omega_* = 2\gamma_{MHD}$, where ω_* is the drift frequency and γ_{MHD} is the single-fluid (MHD) growth rate. We use this result to validate the implementation 2-fluid and gyro-viscous terms into the NIMROD code [2]. For model problems, we demonstrate excellent agreement with analytic predictions. Linear and non-linear results relevant to edge localized modes (ELMs) are also presented. [1] K. V. Roberts and J. B. Taylor, Phys. Rev. Lett. **8**, 197 (1962). [2] C. R. Sovinec, A. H. Glasser, T. H. Gianakon, et al., J. Comp. Phys. **195**, 355 (2004).

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