Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Quasilinear Dynamo Effects In Two-Fluid RFP Model[1] V.V. MIRNOV, C.C. HEGNA, J.P. SAUPPE, C.R. SOVINEC, University of Wisconsin-Madison and Center for Magnetic Self-Organization — Two-fluid effects associated with electron-ion decoupling on small spatial scales modify tearing eigenmode properties and lead to nonzero flux surface averaged Hall dynamos in both slab and cylindrical models of the reversed field pinch (RFP). This result was originally derived for a force-free equilibrium configuration [V.V. Mirnov et al., Plasma Phys. Rep. 29, 612 (2003), IAEA FEC TH/P3-18 (2006)], where contributions from diamagnetic drift effects were neglected. Many authors have investigated the role of equilibrium diamagnetic drift flows on the dynamics of tearing instabilities. For drift-tearing instabilities, diamagnetic effects result in nonzero real mode frequency and corresponding changes to the eigenmode phase relations. We use quasilinear theory to evaluate the effect of the modified cross phases on the MHD and Hall dynamo contributions and analyze an additional dynamo mechanism due to the electron pressure term in the generalized Ohm's law. These results will be compared to measurements from the Madison Symmetric Torus RFP experiment. Numerical computations with the NIMROD code are performed and benchmarked with the analytical results to verify the drift behavior in NIMROD's two-fluid model.

[1]The work is supported by the U. S. DOE and NSF.

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Date submitted: 16 Jul 2012 Electronic form version 1.4