Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Comparing nonlinear MHD simulations of low-aspect-ratio RFPs to RELAX experiments K.J. MCCOLLAM, D.J. DEN HARTOG, C.M. JACOBSON, C.R. SOVINEC, University of Wisconsin, S. MASAMUNE, A. SANPEI, Kyoto Institute of Technology — Standard reversed-field pinch (RFP) plasmas provide a nonlinear dynamical system as a validation domain for numerical MHD simulation codes, with applications in general toroidal confinement scenarios including tokamaks. Using the NIMROD code, we simulate the nonlinear evolution of RFP plasmas similar to those in the RELAX experiment. The experiment's modest Lundquist numbers S (as low as a few times 10^4) make closely matching MHD simulations tractable given present computing resources. Its low aspect ratio (≈ 2) motivates a comparison study using cylindrical and toroidal geometries in NIMROD. We present initial results from nonlinear single-fluid runs at $S = 10^4$ for both geometries and a range of equilibrium parameters, which preliminarily show that the magnetic fluctuations are roughly similar between the two geometries and between simulation and experiment, though there appear to be some qualitative differences in their temporal evolution. Runs at higher S are planned. This work is supported by the U.S. DOE and by the Japan Society for the Promotion of Science.

Karsten McCollam
University of Wisconsin

Date submitted: 15 Jul 2016 Electronic form version 1.4