Abstract Submitted
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Initial Studies of Validation of MHD Models for MST Reversed Field Pinch Plasmas[1] C.M. JACOBSON, A.F. ALMAGRI, D. CRAIG, K.J. MCCOLLAM, J.A. REUSCH, J.P. SAUPPE, C.R. SOVINEC, J.C. TRIANA, University of Wisconsin-Madison — Quantitative validation of visco-resistive MHD models for RFP plasmas takes advantage of MST's advanced diagnostics. These plasmas are largely governed by MHD relaxation activity, so that a broad range of validation metrics can be evaluated. Previous nonlinear simulations using the visco-resistive MHD code DEBS at Lundquist number $S = 4 \times 10^6$ produced equilibrium relaxation cycles in qualitative agreement with experiment, but magnetic fluctuation amplitudes $\tilde{b}$ were at least twice as large as in experiment. The extended-MHD code NIMROD previously suggested that a two-fluid model may be necessary to produce $\tilde{b}$ in agreement with experiment. For best comparisons with DEBS and to keep computational expense tractable, NIMROD is run in single-fluid mode at low S. These simulations are complemented by DEBS at higher S in cylindrical geometry, which will be used to examine $\tilde{b}$ as a function of S. Experimental measurements are used with results from these simulations to evaluate validation metrics. Convergence tests of previous high S DEBS simulations are also discussed, along with benchmarking of DEBS and NIMROD with the SPECYL and PIXIE3D codes.

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