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MHD validation studies for RFPs¹ K.J. MCCOLLAM, D.J. DEN HARTOG, J.A. REUSCH, J.S. SARFF, J.P. SAUPPE, D.D. SCHNACK, C.R. SOVINEC, University of Wisconsin, S. MASAMUNE, Kyoto Institute of Technology — The reversed-field pinch (RFP) provides a nonlinear dynamical system suitable for validation studies of extended MHD, wherein laboratory measurements and resistive-MHD code results are compared so as to quantitatively evaluate the physical applicability of the mathematical model expressed in the code. We present plans for validation of the DEBS and NIMROD codes using the MST and RELAX RFP experiments, along with updates of results to date. MST operates in the full range of Lundquist number S accessible to the codes, and we identify metrics to be used for comparisons of sawtooth relaxation cycles at different S values. Previous work with the cylindrical, single-fluid DEBS code showed some quantitative agreement between code and experiment but disagreement for magnetic-fluctuation amplitudes (Reusch *et al.*, PRL, 2011). Cylindrical NIMROD simulations with two-fluid effects gave closer agreement for the amplitudes (King *et al.*, POP, 2012), but the two code studies were done using different fluid viscosities, which may also contribute to the different results. RELAX has a low aspect ratio of 2, which motivates comparisons to NIMROD runs in both cylindrical and toroidal geometry.

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Karsten McCollam
University of Wisconsin

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