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Behavior of m=0 Modes in DEBS Modeling and MST Plasmas D. CRAIG, R. HESSE, D. MARTIN, Wheaton College (IL), D.J. DEN HARTOG, C.M. JACOBSON, K.J. MCCOLLAM, M.D. NORNBERG, J.A. REUSCH, University of Wisconsin - Madison — In the reversed field pinch (RFP), poloidal mode number m=0 fluctuations are driven through nonlinear coupling with unstable m=1 tearing modes. Many relaxation processes are strongly linked to the behavior of the m=0 modes and hence understanding and controlling them has high leverage for many physics studies. We explore the dependence of m=0 modes on several key parameters in both MST experiments and visco-resistive MHD simulations using the DEBS code. In both experiment and code, m=0 modes are suppressed by removing their resonant surface from the plasma though the suppression is more complete in the experiment. Reduced m=0 magnetic mode amplitudes are correlated with a reduction in the m=1 mode velocity fluctuations in both experiment and code. The time scale for m=0 mode amplitudes to rise and fall during relaxation events does not depend strongly on the degree of magnetic field reversal in the experiment or in the code. Systematic variation of the Lundquist number and magnetic Prandtl number in the code shows that both resistivity and viscosity affect the temporal evolution of the m=0 modes during relaxation events. The effect of the edge resistivity profile and the electric field boundary condition on m=0 modes is also examined in the code. These observations are discussed in relation to the nonlinearly driven reconnection paradigm for m=0 mode evolution. This work has been supported by the US DOE and NSF.

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