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Modeling the Magnetorotational Instability in Differentially Rotating Plasmas WILSON TILLOTSON, WILLIAM DORLAND, DANIEL LATHROP, NICOLAS MUJICA, DANIEL SISAN, University of Maryland — When threaded by a weak magnetic field, a differentially rotating ionized fluid can be unstable to the Magnetorotational Instability (MRI). The MRI is a likely mechanism for enhanced angular momentum transport in accretion disks. We use an explicit, finite difference algorithm to model MRI turbulence in a plasma confined between differentially rotating, concentric cylinders. In addition to reproducing the stability boundaries and growth rates predicted by the local linear dispersion relation, we have investigated some nonlinear characteristics of MRI, including the potential for parasitic instabilities to saturate the instability and the effects of boundary layers on saturated flow profiles. (There are hydrodynamic instabilities associated with the boundary layers.) We also discuss precession characteristics of nonaxisymmetric modes and nonlinear mode interactions long after saturation.

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