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**Axisymmetric Numerical and Analytical Studies of the Helical Magnetorotational Instability in a Magnetized Taylor-Couette Flow**[1] WEI LIU, CMSO, PPPL, JEREMY GOODMAN, Princeton University, HANTAO JI, CMSO, PPPL — Recently, Hollerbach and Rüdiger have reported that MRI modes may grow at much reduced $R_{\rm m}$ and $S$ in the presence of a helical background field, a current-free combination of axial and toroidal field. We have investigated these helical MRI modes. In vertically infinite or periodic cylinders, resistive HMRI is a weakly destabilized hydrodynamic inertial oscillation propagating axially along the background Poynting flux. Growth rates are small, however, and require large axial currents. The new mode is stable in Keplerian flow profiles regardless of end conditions. Furthermore, inviscid studies show finite cylinders with insulating endcaps reduce the growth rate and stabilize highly resistive flows entirely, which conflicts with the PROMISE observation at low magnetic Reynolds number. However, in viscous simulations, by accurately modeling all viscous and magnetic boundaries, we reproduce the measured wave patterns and their amplitudes. Contrary to previous claims, the waves are shown to be transiently amplified disturbances launched by viscous boundary layers rather than globally unstable magnetorotational modes.

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