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Overview of recent results from the Princeton MRI experiment[1]
ERIK SPENCE, Princeton Plasma Physics Laboratory, AUSTIN ROACH, ERIC EDLUND, HANTAO JI, Princeton Plasma Physics Laboratory, CHRISTOPHE GISSINGER, Princeton University — The magnetorotational instability (MRI) is believed to generate the turbulence in accretion disks needed to explain observationally inferred accretion rates. The Princeton MRI experiment is a Taylor-Couette device used to generate conditions under which the MRI should be unstable, namely a radially decreasing azimuthal velocity profile in a vertical magnetic field. The velocity field of the working fluid, GaInSn, is measured using an ultrasonic Doppler velocimetry system. Though an ideal-Couette profile can almost be attained, through the ability to modify the end-cap ring speeds of the experiment, residual Ekman circulation remains. This secondary circulation moves in the same radial direction as the flow expected from the MRI, complicating the instability's identification. Comparison of radial flows in MRI-stable and MRI-unstable regimes is used to search for the instability's signature. Three dimensional numerical simulations are also compared to experimental data to determine proximity to instability.

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