Abstract Submitted
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Initial Results from the Magnetorotational Instability Experiment (MRI) Upgrade[1] ERIK GILSON, ERIC EDLUND, Princeton Plasma Physics Laboratory, JEREMY GOODMAN, Princeton University, HANTAO JI, Princeton Plasma Physics Laboratory, Princeton University, AVEEK KAPAT, University of Illinois at Urbana-Champaign, ETHAN SCHARTMAN, Nova Photonics, Inc., PETER SLOBODA, Princeton Plasma Physics Laboratory, XING WEI, Princeton University — The Magnetorotational Instability experiment (MRI) has been upgraded to enable reliable operation at the high rotation rates required to obtain the MRI by implementing mechanical improvements, and to increase the expected saturation amplitude of the MRI by installing electrically conductive end caps. Initial experimental results are presented that determine the extent to which the optimized baseline configuration matches the ideal Taylor-Couette rotation profile in the absence of a magnetic field. Radial velocity measurements with an improved ultrasound Doppler velocimetry configuration are compared to numerical simulations of the Ekman configuration. High-speed runs extend the results of Roach [1] to speeds between 60% and 100% of the design limit in order to investigate whether the observed simple scaling of the normalized azimuthal velocity with the normalized magnetic field can serve as a suitable baseline against which to identify the MRI. Plans are discussed for an experimental campaign to identify the MRI by measuring radial velocities and magnetic fields, in addition to changes to the azimuthal velocity, as predicted by simulations.

[1] Austin Roach, Ph. D. Thesis, Princeton University (2013).

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