

Abstract Submitted
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An Unmagnetized, Plasma Couette flow for investigating the Magnetorotational Instability CARY FOREST, University of Wisconsin, Madison — A new plasma experiment to investigate the magnetorotational instability, dynamos, and other fundamental plasma processes for astrophysics is proposed. The experiment consists of a vacuum chamber with a series of permanent magnetics, with electrically insulated pole faces, in a ring cusp geometry (poles facing inward with alternating polarity along the vessel wall). The resulting field is axisymmetric and decays quickly away from the walls providing a large, magnetic field free region in the center of the device. To stir the plasma, cathodes positioned between the magnet rings are biased such that the resulting electric field induces plasma rotation through the ExB drift. The flow drive principle is quite general and simulations indicate that the high magnetic Reynolds number plasmas flows can in principle be generated that are unstable to the magnetorotational instability. Use of a plasma for such an experiment may allow the magnetic Reynolds number (the dimensionless parameter governing self-excitation of magnetic fields) to be approximately a factor of 10 larger than in liquid metal experiments and will be the first experiment to investigate the MRI in a plasma, the state of matter that makes up naturally occurring accretion disks.

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