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Progress Towards Creating the Magnetorotational Instability in the Plasma Couette Experiment[1] C. COLLINS, C. COOPER, P. BONOFIGLO, B. SEIDLITZ, C. WAHL, M. CLARK, J. WALLACE, C.B. FOREST, University of Wisconsin - Madison — The magnetorotational instability (MRI) is a mechanism of interest for its role in angular momentum transport in astrophysical accretion disks, yet its existence has never been verified in a laboratory plasma. In the Plasma Couette Experiment (PCX), a technique for stirring a sufficiently hot, unmagnetized plasma has been demonstrated, making it possible to access regimes shown to excite the MRI in local linear analysis and global Hall-MHD numerical simulations. In the experiment, plasma is confined in a cylindrical, axisymmetric, multicusp magnetic field. Azimuthal flows (up to 10 km/s) are driven by JxB torque using biased, heated filaments at a single toroidal position in the magnetized edge. Mach probe measurements show that collisional ion viscosity couples momentum from the magnetized edge to the unmagnetized bulk. A laser-induced fluorescence diagnostic has been developed to verify the ion flow, measure the ion temperature, and confirm Braginskii's formulas for viscosity. Efforts are now underway to observe the MRI by driving sheared flow and applying a weak vertical magnetic field to destabilize the plasma.

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