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Flow Generation in the Plasma Couette Experiment[1] C. COLLINS, N. KATZ, D. WEISBERG, M. CLARK, J. WALLACE, C.B. FOREST, University of Wisconsin, Madison — One goal of the Plasma Couette Experiment (PCX) is to study the magnetorotational instability (MRI), a fundamental mechanism in astrophysical accretion disks. Local linear stability analysis suggests that densities of 10^{12} cm^{-3} and velocities of 10 km/s are sufficient for onset of MRI. In PCX, plasma is produced either by a LaB_6 cathode, or by electron cyclotron resonance heating and is confined by a cylindrical, axisymmetric, highly localized ring cusp magnetic field at the boundary. Preliminary LaB_6 plasmas have already achieved Te=10 eV and n=5x10^{10} cm^{-3} with only 400 W discharge power. To create the differential rotation necessary to study MRI, electrode rings between the magnets are biased to induce ExB rotation. Mach probe measurements indicate that the azimuthal plasma flow velocity reaches 2 km/s with 50% modulations, depending on distance from the electrodes. This suggests the presence of diamagnetic flows due to the density gradient in the multicusp field. Controlling the plasma rotation profile with the electrodes depends critically on electrode location and the efficiency of velocity transfer through viscous effects.

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