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Recent Results from the Plasma Couette Experiment¹ NOAM KATZ, CAMI COLLINS, CHRIS COOPER, JOHN WALLACE, MIKE CLARK, INGRID REESE, CARL WAHL, CARY FOREST, University of Wisconsin, Madison — The Plasma Couette Experiment (PCX) has been designed to study the magnetorotational instability (MRI) in a laboratory plasma. As a first step towards this goal, we have achieved solid-body rotation of an unmagnetized plasma for the first time. We apply $\mathbf{J} \times \mathbf{B}$ torque at the magnetized edge region of a “magnetic bucket,” and the momentum couples into the unmagnetized bulk plasma through collisional viscosity. In order for momentum to couple inward from the edge, it is crucial that the ion viscosity dominate the drag due to ion-neutral charge exchange collisions. The next steps towards laboratory observation of the MRI involve driving sheared flow (since solid-body flow is stable to the MRI) and applying a weak vertical magnetic field to destabilize the plasma. We will describe our recent progress in these areas, as well as development of a laser-induced fluorescence diagnostic to better characterize the velocity profile and measure the ion temperature.

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