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Experimental Characterization of Plasma Flow in Reconnection Scaling Experiment. L. DORF, X. SUN, T. INTRATOR, J. HENDRYX, G. WURDEN, (LANL) — Reconnection Scaling Experiment (RSX) studies linear and non-linear evolution of up to four interacting current-carrying plasma cords with emphasis on kink instability and magnetic reconnection. During the kink instability, the presence of an axial flow gives rise to a Doppler shifted frequency and rotation of the kink, which makes studying the flow important. The axial velocity, plasma density, and electron temperature in one plasma column were measured on RSX with the miniaturized Mach and triple electrostatic probes installed on 3D positioning systems. Significant plasma flow with the velocity on the order of the ion acoustic speed was detected, with the velocity decreasing downstream. 2D profiles obtained at two axial locations were then employed to estimate the radial profile of the ion viscosity using the integral momentum balance equation. The results show that the ion momentum flux is dissipated by the ion-ion viscosity due to significant radial shear of axial velocity. Chord-integrated ion temperature measurements performed at several radial locations using Doppler broadening spectroscopy show temperature of about 1eV. Comparison of the measured viscosity with Braginskii's theoretical predictions demonstrates a good agreement, which is an important new result useful for both astrophysical jets and magnetoplasmadynamic thrusters. Supported by OFES, and DOE/LANL contract DE-AC52-06NA25396.

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