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Flow dynamics of spheromaks in SSX[1] MICHAEL BROWN, CHRIS COTHRAN, DAVID COHEN, JASON HORWITZ, VERNON CHAPLIN, Swarthmore College — We report several new experimental results related to flow dynamics from single dipole-trapped spheromaks and spheromak merging studies at SSX. Local spheromak flow is studied with two Mach probes ($r_1 \leq \rho_i, r_2 \geq \rho_i$) calibrated by time-of-flight with a fast set of magnetic probes at the edge of the device. Both Mach probes feature six ion collectors housed in a boron nitride sheath. The larger Mach probe will ultimately be used in the MST reversed field pinch. Line averaged flow is measured by ion Doppler spectroscopy at the midplane. The SSX IDS instrument measures with 1 μs or better time resolution the width and Doppler shift of the C_{III} impurity (H plasma) 229.7 nm line to determine the temperature and line- averaged flow velocity. We find axial flows up to 100 km/s during formation of the dipole trapped spheromak. Flow returns at the wall to form a large vortex. We also measure $T_i \geq 50$ eV and $T_e \geq 20$ eV during spheromak merging events after all plasma facing surfaces are cleaned with helium glow discharge conditioning. T_e is measured with a 4-channel soft x-ray array. These studies are performed in the prolate 0.4 m diameter, $L = 0.6$ m length copper flux conserver in SSX. The spheromaks are also characterized by a suite of magnetic probe arrays for magnetic structure $\mathbf{B}$(r,t), and interferometry for n_e.

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