

Abstract Submitted
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Flow Measurements on Single and Merging Spheromaks at SSX¹

JASON HORWITZ, MICHAEL BROWN, CHRIS COTHRAN, Swarthmore College — We present new experimental results concerning flow dynamics in single spheromaks and counter-helicity spheromak merging at the Swarthmore Spheromak Experiment (SSX). Local flow is measured with a Mach probe, consisting of six directional ion collectors in a boron nitride sheath. Calibration made with the assistance of an edge array of magnetic probes provides a calibration constant k of approximately 1.6 for the Mach probe. This value is consistent with other values determined both theoretically and experimentally for Mach probes in the unmagnetized realm. In the single spheromak we observe initial axial flows of twice the sound speed followed by a rapid reversal of flow at the center and edge of the chamber. Later azimuthal flows could indicate a flipping of the plasma due to formation instabilities. During counter-helicity merging, we observe the expected azimuthal flow on average at a radius outside the reconnection region, but fail to obtain a clear direction of flow at the inner radius. Results from a larger Mach probe (magnetized realm) will be presented if available. A two-dimensional magnetic probe array with high spatial resolution (2.3 mm) is being constructed and will be used to analyze magnetic fields near the reconnection plane during counter-helicity merging.

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