Abstract Submitted
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Predictive capability for whole-device spheromak MHD physics[1]

E.B. HOOPER, B.I. COHEN, LLNL, SSPX TEAM — Resistive, single-fluid (NIMROD) MHD simulations reproduce many SSPX results and contribute to our understanding of spheromak physics. Simulation is benchmarked to experiment including sensitivity to simulation parameters: viscosity, maximum toroidal mode number, finite-element number, density, and particle diffusivity. Quantities comparing well with experiment include gun voltage, thresholds for spheromak formation and sustainment, and magnetic field strength and time evolution. MHD mode amplitudes and q-profiles are moderately sensitive. Precise time histories, e.g., the rate of reconnection events, are more sensitive but have little effect on average quantities, e.g. magnetic field strength. Experimental Te is 20-50% higher than simulations – flux surface quality is very sensitive to small changes in mode activity. The results provide confidence in simulations of upgrades or advanced spheromak experiments. Refs.: C.R. Sovinec, et al., Phys. Rev. Lett. **94**, 035003 (2005); B.I. Cohen, et al., Phys. Plas. **12**, 056106 (2005); E.B. Hooper et al., Phys Plas. **12**, 092503 (2005); E.B. Hooper, et al., Nucl. Fusion (in press).

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