Abstract Submitted
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Effects of the current boundary conditions at the plasma-gun gap on density in SSPX ROMAN KOLESNIKOV, L.L. LODESTRO, W.H. MEYER, LLNL — The Sustained Spheromak Physics Experiment (SSPX) was a toroidal magnetic-confinement device without toroidal magnetic-field coils or a central transformer but which generated core-plasma currents by dynamo processes driven by coaxial plasma-gun injection into a flux-conserving vessel. Record electron temperatures in a spheromak ($T_e \sim 500$eV) were achieved, and final results of the SSPX program were reported in [1]. Plasma density, which depended strongly on wall conditions, was an important parameter in SSPX. It was observed that density rises with $I_{\rm gun}$ and that confinement improved as the density was lowered. Shortly after the last experiments, a new feature was added to the Corsica code's solver used to reconstruct SSPX equilibria. Motivated by $n = 0$ fields observed in NIMROD simulations of SSPX, an insulating boundary condition was implemented at the plasma-gun gap. Using this option we will perform new reconstructions of SSPX equilibria and look for correlations between the location of the separatrix (which moves up the gun wall and onto the insulating gap as $I_{\rm gun}$ increases) and plasma density and magnetic-flux amplification [2].

[1] H. S. McLean, APS, DPP, Dallas, TX, 2008.
[2] E. B. Hooper et al., Nucl. Fusion 47, 1064 (2007).

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