

Abstract Submitted  
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**Refluxing physics for quasisteady state spheromak sustainment<sup>1</sup>**

E.B. HOOPER, LLNL — “Refluxing” for spheromak sustainment injects helicity during formation, followed by a slowly-decaying, high confinement phase. The plasma is rebuilt before the magnetic flux fully decays, and the cycle repeated as demonstrated in the SSPX experiment [1]. Numerical simulations (NIMROD code) and axisymmetric modeling including transport (CORSICA code) extend the experimental study, improving the confinement phase using bias flux reduction [2]. The free energy in the injected current is reduced, lowering the level of magnetic fluctuations. Flux amplification during buildup is increased above SSPX, achieving higher  $T_e$  and lengthening the confinement phase duration. Calculations use the SSPX flux-conserving geometry to maintain contact with experiment; some issues with this geometry at high flux amplification are analyzed. Current profile control including edge boundary condition on  $j/B$  is considered for limiting internal magnetic mode amplitudes. Opportunities for further improvement of this scenario are identified. [1] B. Hudson, et al., Phys. Plasmas 15, 056112 (2008). [2] E. B. Hooper, et al., Nucl. Fusion 47, 1064 (2007).

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