Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Spheromak aspect-ratio effects on poloidal flux amplification[1] E.B. HOOPER, H.S. MCLEAN, C.A. ROMERO-TALAMAS, R.D. WOOD, LLNL — A short experimental run at the end of SSPX operation examined the effect of increasing the flux conserver length-to-aspect ration, L/R, from 1 to 1.2, thereby reducing the formation threshold for $\lambda_{gun} = \mu_0 I_{gun}/\Psi_{gun}$ from 10 m^{-1} to $\approx$ 7.5 m^{-1} with a corresponding increase in power efficiency [1]. Resistive MHD (NIMROD) simulations of flux amplification which agreed well with experiment at L/R=1 [2] agree fairly well with L/R=1.2 and have been extended to L/R=1.6, just under the tilt-mode stability limit (1.67) for an isolated spheromak. At the longest length, helicity injection changes from a chaotic relaxation process to a steady, high amplitude n=1 mode which opens the field lines throughout most of the flux conserver. Calculations are presented to elucidate the characteristics of the chaos for the standard flux-conserver dimensions. Comparisons are made among the simulations to determine the "optimum" L/R based on a trade-off between spheromak buildup efficiency and low mode activity. [1] R. D. Wood, et al., submitted to Phys. Rev. Letters. [2] E. B. Hooper, et al., Nucl. Fusion **47**, 1064 (2007).

[1]Work performed under the auspices of the U.S. Department of Energy under contracts W7405-ENG-48 and DE-AC52-07NA27344 at LLNL.

E. B. Hooper
LLNL

Date submitted: 27 Jun 2008 Electronic form version 1.4