Abstract Submitted
for the APR06 Meeting of
The American Physical Society

Resistive MHD simulations in support of SSPX[1] E.B. HOOPER, B.I. COHEN, L.L. LODESTRO, LLNL, C.R. SOVINEC, U. Wisc. — The SSPX spheromak has obtained Btor>0.6T, Te=350eV and t(pulse)≈3ms. NIMROD simulations are used to interpret results, guide experiments, and explore upgrades. Voltage spikes during formation and sustainment are interpreted as reconnection across an n=1, negative-current layer close to the mean-field x-point. Field lines are chaotic during these events, causing rapid electron energy loss to the walls; Te<50eV in experiment and simulation during strong helicity injection. Sustainment occurs at a high ratio of gun current to bias flux. During slow plasma decay at low gun current, high Te results when magnetic fluctuations are low (<1%). If q crosses low-order rational surfaces, islands form causing reduced energy confinement. Fieldlines can become chaotic (Lyapanov length > 4πR); if they reach walls Te drops to <50eV. Changing Zeff=1 to 2.3 (SSPX value) increases ohmic heating and decreases parallel thermal conduction, affecting spheromak evolution. An experimental upgrade to allow bias field reduction following formation may allow increased efficiency operation.

[1]Work performed under auspices of the U. S. DOE by U. California LLNL under contract No. W-7405-Eng-48.

E.B. Hooper
LLNL

Date submitted: 12 Jan 2006 Electronic form version 1.4