

Abstract Submitted  
for the DPP08 Meeting of  
The American Physical Society

**The Relationship of the  $n=1$  Column Mode to Spheromak Formation**<sup>1</sup> B.I. COHEN, E.B. HOOPER, L.L. LODESTRO, D.D. RYUTOV, H.S. MCLEAN, C.A. ROMERO-TALAMAS<sup>2</sup>, R.D. WOOD, Lawrence Livermore National Laboratory — Observations from spheromaks and simulations [1] using the time-dependent, nonlinear, resistive magnetohydrodynamic code NIMROD indicate that in the formation phase an  $n=1$  instability (toroidal Fourier mode) is excited by the current driven down the plasma column by electrostatic current injection into the spheromak. Toroidal harmonics are generated, partly by nonlinear effects; and the growth of the column mode terminates in a violent reconnection event that forms the spheromak: toroidal flux reconnects and poloidal flux emerges. By means of NIMROD simulations, detailed diagnostics, visualizations, and analytical calculations, we investigate the relationship between the  $n=1$  column mode and the reconnection event that forms the spheromak. [1] C. R. Sovinec, B. I. Cohen, et al., Phys. Rev. Lett. 94, 035003 (2005); B.I. Cohen, E.B. Hooper, et al., Phys. Plasmas 12, 056106 (2005); E. B. Hooper, B. I. Cohen, et al., J. Fusion Energy 26, 71 (2007); E. B. Hooper, B. I. Cohen, et al., Phys. Plasmas 15, 032502 (2008).

<sup>1</sup>Work performed by LLNL under auspices of U.S. DoE under contract DE-AC52-07NA27344.

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Date submitted: 10 Jul 2008

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