Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Nonaxisymmetric effects in strongly driven Coaxial Helicity Injection in simulations of NSTX[1] E.B. HOOPER, Woodruff Scientific, C.R. SOVINEC, U. Wisconsin — Nonaxisymmetric effects become important in strongly-driven CHI in NSTX simulations using NIMROD. An n?1, high m mode excited in simulations of injection and flux closure can significantly impact the injected poloidal flux evolution and closure [1,2]. In nonlinear simulations, the mode velocity and magnetic perturbations occur in "bursts;" in previous, lower temperature work the mode was weak and not bursting, with little effect on the injection [1]. The mode is excited just outside the poloidal flux bubble with axes of poloidal velocity vortexes and magnetic flux surfaces aligned along the magnetic field. Their width is approximately that of the current layer in the surface of the bubble. The instability significantly broadens the current layer and apparently is driven in part by currents resulting from expansion of the injected poloidal flux. Linear simulations starting from nonlinear, purely axisymmetric simulations or from the axisymmetric parts of nonaxisymmetric simulations yield the linear eigenmodes and sensitivity to plasma parameters. Ongoing analysis to identify the driving mechanism(s) for the instability is constrained by these linear results.

[1] E B Hooper, et al., Phys. Plasmas 20, 092510 (2013)
[2] F Ebrahimi, et al., Phys. Plasmas 20, 090702 (2013)

[1]Work performed by Woodruff Scientific for LLNL under Contract DE-AC52-07NA27344.

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Date submitted: 22 Jul 2015 Electronic form version 1.4