Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Effect of low frequency MHD instability on fast ion distribution in NSTX[1] G. HAO, D. LIU, W.W. HEIDBRINK, UC Irvine, M. PODESTA, E.D. FREDRICKSON, A. BORTOLON, R. WHITE, D. DARROW, G.Y. FU, Z.R. WANG, G.J. KRAMER, PPPL, Y.Q. LIU, CCFE, K. TRITZ, Johns Hopkins U
— In NSTX spherical tokamak plasmas, the onset of low-frequency MHD modes cause a rapid $\sim 25\%$ reduction in the fast-ion D-alpha (FIDA) signal. These, 5-20 kHz instabilities are commonly observed in the early phase of neutral beam heated plasmas that often have reversed magnetic shear in the plasma core. The collapse of the core fast ion density is measured by the vertical FIDA diagnostic. Although the profile flattens, changes in spectral shape are modest, suggesting that much of the distribution function is affected. Meanwhile, a modest increase of fast-ion losses is indicated by the measurements from neutron and fast-ion loss detectors. Moreover, this mode is always accompanied by Compressional Alfven Eigenmode (CAE). This suggests that low-f MHD instabilities can cause the redistribution of fast ions in both real and velocity space. Preliminary simulation results from the MARS-F code suggest that the low-f instability is a coupled infernal-peeling mode. The dependence of the mode's onset on the equilibrium parameters and its effect on the fast ion distribution will be computed, and compared with experimental measurements.

[1]Work supported by U.S. DOE DE-AC0209CH11466, DE-FG02-06ER54867, and DE-FG03-02ER54681

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Date submitted: 24 Jul 2015 Electronic form version 1.4