Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Effect of Fast-ion Distribution Function on Beam Driven Instabilities in NSTX[1] E. RUSKOV, W.W. HEIDBRINK, UC Irvine, E.D. FREDRICKSON, D. DARROW, S. MEDLEY, N. GORELENKOV, PPPL — The deuterium beam distribution function is modified from shot to shot while keeping the total injected power to ∼2 MW. The experimental "knobs" are the beam energy (90 keV and 60 keV), the beam tangency radius, and the fraction of trapped beam ions, which is modified at a predetermined time by applying $\sim \geq 2$ MW of high harmonic fast wave (HHFW) heating. Neutral particle analysis confirms perpendicular acceleration of the beam ions. The neutral beams are injected into a helium L-mode plasma and produce a rich set of instabilities, including TAE modes, instabilities with rapid frequency sweeps or chirps, and strong, low frequency (10-20 kHz) fishbones. Fishbones are excited when $q_0 < 0$ and when the trapped beam-ion fraction increases; they are always present later in the discharge. However, TAE modes are excited only early in the discharge and, under some circumstances, they are suppressed by HHFW heating on a collisional time scale. In contrast with a Dipole experiment,[2] the cyclotron heating has no effect on the chirping instabilities.

[1]Supported by U.S. DOE contract DE-FG03-02ER54681.
[2]D. Maslovsky, B. Levitt and M. E. Mauel, Phys. Plasmas **10** (2003) 1549.

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Date submitted: 22 Jul 2005 Electronic form version 1.4