Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

**Impact of rotation and kinetic damping on the NSTX ideal-wall limit**[1] JONATHAN MENARD, Princeton Plasma Physics Laboratory, YUE-QIANG LIU, Culham Centre for Fusion Energy — Kinetic resonances have previously been identified to play an important role in the stability of the resistive wall mode (RWM) in high-beta NSTX plasmas operating above the ideal no-wall stability limit. Under such circumstances, the "plasma mode" which determines the with-wall limit is typically assumed to be stable. To assess this assumption, systematic kinetic stability analysis of the with-wall limit has been carried out for the first time using the MARS-K code for NSTX. The stability of the plasma mode is found to be a sensitive function of rotation and dissipation. Specifically, calculations indicate that as the rotation is increased to experimental values in the absence of dissipation, the n=1 mode becomes unstable at the experimental nominal wall position of the wall which is inconsistent with experiment. Inclusion of strong parallel sound-wave damping does not substantially change the ideal plasma mode stability. Including perpendicular damping through precession resonances can recover plasma mode stability at high rotation, but only for small plasma-wall gap. Importantly, the inclusion of full kinetic damping model (precession + bounce + transit resonances) can significantly increase plasma mode stability consistent with the experiment.

[1]This work is supported by U.S. DOE Contract DE-AC02-09CH11466.

Jonathan Menard
Princeton Plasma Physics Laboratory

Date submitted: 10 Jul 2012 Electronic form version 1.4