

Abstract Submitted
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Comparison of measurements and modeling of beam ion loss during TAE avalanches in NSTX¹ DOUGLASS DARROW, PPPL, N. CROCKER, UCLA, E. FREDRICKSON, N. GORELENKOV, M. PODESTA, L. SHI, R. WHITE, PPPL — Brief ‘avalanches’ of toroidal Alfvén eigenmodes (TAEs) are observed in NSTX plasmas having several different n numbers simultaneously present. All are accompanied by a drop in the neutron rate, indicating likely loss of beam ions. However, the scintillator fast ion loss detector at the wall on NSTX registers losses only for some avalanches and not others. When losses are seen, they cover a wide range of pitch angles, suggesting that the modes cause stochasticity in the beam ion phase space. A 16 channel array of microwave reflectometers provides a radial profile of the structure of each n TAE, which can then be used to produce an absolute amplitude for a TAE mode structure computed by the NOVA code for the plasma at the time of interest. Using the equilibrium plus the TAE modes structures in the guiding center code ORBIT then allows modeling of the effect of the avalanches on beam ion orbits. The modeling does reveal stochastic behavior and loss of some classes of orbits that are populated by the neutral beams on NSTX, with an amplitude threshold for loss that is close to that observed in the experiments.

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