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M3D-K Simulations of Toroidicity-induced Alfvén Eigenmodes on NSTX D. LIU, UC Irvine, G.Y. FU, J.A. BRESLAU, E.D. FREDRICKSON, M. PODESTA, PPPL, N.A. CROCKER, S. KUBOTA, UCLA — Energetic particle modes and Alfvénic modes driven by super-alfvénic beam ions are routinely observed in neutral beam heated plasmas on the National Spherical Torus Experiment (NSTX). These modes can significantly impact beam-ion transport, thus cause beam-ion redistribution or loss. Hybrid kinetic/MHD simulations of Toroidicity-induced Alfvén Eigenmodes (TAEs) in NSTX plasmas have been carried out with the M3D-K code using experimental plasma profiles. The simulations show that unstable TAEs with n=2-5 can be excited by the beam ions. Mode frequency, structure and phase shift are roughly consistent with experimental measurements from a multi-channel reflectometer diagnostic. A sensitivity study on plasma rotation, q profile and equilibrium beam-ion distribution is performed. It is found that rotation has a significant destabilizing effect on mode stability at experimental level. The growth rate is also sensitive to q_{min} position and beam-ion distribution. But mode structure and peak position have weak dependence on these factors. To investigate the effects of beam ion distribution on mode stability, an interface between the fast ion Monte Carlo modeling code NUBEAM and M3D-K has been developed. The fast ion distribution in phase-space coordinates from NUBEAM is converted to a set of continuously and differentiable 2D cubic B-splines in the (P_φ, E) space with a set of discrete bins in μ direction. The comparison between M3D-K simulations with analytic and NUBEAM fast ion distribution will be discussed. *Work supported by US DOE.*

D. Liu
UC Irvine

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