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Numerical Simulations of NBI-driven CAE modes in H-mode Discharges in NSTX[1] E.V. BELOVA, N.N. GORELENKOV, N.A. CROCKER, E.D. FREDRICKSON, Princeton Plasma Physics Laboratory — Excitation of co- and counter-propagating compressional Alfven modes (CAEs) have been observed for H-mode NSTX discharges. Hybrid 3D code HYM has been used to investigate properties of beam ion driven CAE modes in NSTX. The HYM code is a nonlinear, global stability code in toroidal geometry, which includes fully kinetic ion description. Numerical simulations have been performed for the NSTX shots with strong CAE activity. It is shown that co-propagating CAE mode can be excited for large toroidal mode numbers $n \geq 8$ and frequency range $f > 0.4 f_{ci}$, consistent with observations. In contrast to GAE modes, large compressional magnetic perturbation is seen both in the core and at the plasma edge for CAE modes. Conditions which are favorable for CAE instability are studied, including the effects of the plasma density profiles, beam ion parameters, and magnetic profiles. It is shown that lower energy beam ions satisfy regular resonance conditions, whereas high energy beam ions satisfy Doppler-shifted cyclotron resonance condition. Relative contributions of different groups of resonant particles, their location in the phase-space and corresponding types of particle orbits are investigated.

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