Abstract Submitted
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Nonlinear Simulations of Energetic Particle Effects in Fusion Plasmas.[1] ELENA BELOVA, Princeton Plasma Physics Laboratory — Neutral beam injection is an effective way to heat and sustain plasma in a variety of magnetic confinement concepts. The presence of energetic beam ions can significantly modify both the equilibrium and stability properties of such plasmas, particularly when the injection velocity of the fast ions is larger than the Alfven velocity. Possibility of resonant excitation of background plasma eigenmodes and a large Larmor radius of the energetic ions necessitates their kinetic description. Different hybrid MHD/kinetic models introduced to self-consistently couple the bulk fluid plasma with energetic particles are discussed. Results of 3D nonlinear simulations are presented demonstrating that beam-driven modes can significantly modify the transport properties of the background plasma, and channel the energy of the beam ions from the injection region to the location of the resonant mode conversion at the edge of the beam density profile. Unstable eigenmode can cause changes in beam ion distribution, creating an energetic tail and reducing the population of mid-range particles.

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