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Coupling of Neutral-beam-driven Compressional Alfvén Eigenmodes to Kinetic Alfvén Waves in NSTX and Energy Channelling

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An energy channeling mechanism is proposed to explain flattening of the electron temperature profiles at high beam power in beam-heated National Spherical Torus Experiment (NSTX). High-frequency Alfvén eigenmodes are frequently observed in beam-heated NSTX plasmas, and have been linked to enhanced thermal electron transport and flattening of the electron temperature profiles. Results of 3D nonlinear self-consistent simulations of neutral-beam-driven compressional Alfvén eigenmodes (CAEs) in NSTX are presented that demonstrate strong coupling of CAE to kinetic Alfvén wave at the Alfvén resonance location. It is shown that CAE can channel significant fraction of the beam energy to the location of the resonant mode conversion at the edge of the beam density profile, modifying the energy deposition profile.

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