Abstract Submitted
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A Two Species Bump-On-Tail Model With Relaxation for Energetic Particle Driven Modes[1] V. ASLANYAN, M. PORKOLAB, MIT-PSFC, S. E. SHARAPOV, CCFE UK, D. A. SPONG, ORNL — Energetic particle driven Alfvén Eigenmodes (AEs) observed in present day experiments exhibit various nonlinear behaviours varying from steady state amplitude at a fixed frequency to bursting amplitudes and sweeping frequency. Using the appropriate action-angle variables, the problem of resonant wave-particle interaction becomes effectively one-dimensional. Previously, a simple one-dimensional Bump-On-Tail (BOT) model has proven to be one of the most effective in describing characteristic nonlinear near-threshold wave evolution scenarios. In particular, dynamical friction causes bursting mode evolution, while diffusive relaxation may give steady-state, periodic or chaotic mode evolution. BOT has now been extended to include two populations of fast particles, with one dominated by dynamical friction at the resonance and the other by diffusion; the relative size of the populations determines the temporal evolution of the resulting wave. This suggests an explanation for recent observations on the TJ-II stellarator, where a transition between steady state and bursting occured as the magnetic configuration varied. The two species model is then applied to burning plasma with drag-dominated alpha particles and diffusion-dominated ICRH accelerated minority ions.

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