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**Nonlinear simulation of Toroidicity-induced Alfvén Eigenmode with source and sink** JIANYING LANG, GUO-YONG FU, Princeton Plasma Physics Laboratory, YANG CHEN, Univ. of Colorado at Boulder — It has been known that in collisionless plasmas the nonlinear saturation of energetic particle-driven modes is caused by wave-particle trapping effect, which flattens the spatial distribution function of resonant particles and reduces the drive. However, when energetic particles are sufficiently collisional, much more complicated physics is involved during the nonlinear process. The nonlinear behavior of a single TAE is studied using the kinetic/MHD hybrid code m3d-K [Fu, Phys. Plasmas, 2006] in the presence of pitch-angle scattering, source, sink, and the slowing-down process. In the presence of only pitch-angle scattering, both steady state and pulsation behaviors are observed depending on the regime of collision rate. For steady state cases, the scaling of nonlinear saturation level with collision rate agrees with the analytical prediction [Berk, Phys. Plasmas, 1990]. Our preliminary simulations with source, sink, and slowing-down process have obtained nonlinear steady state, where the saturation level increases with slowing-down rate. Flattening in the spatial distribution function is observed during nonlinear saturation. Detailed variation of distribution function and parameter scaling will be further explored and compared to analytic theories. This work is supported by DOE Energetic Particle Simulation Center PEPSC.

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