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Quasilinear Model for Energetic Particles Interacting with TAE Modes[1] KATY GHANTOUS, NIKOLAI GORELENKOV, Princeton Plasma Physics Lab, HERBERT BERK, Institute for Fusion Studies — TAE instabilities are thought to be a major source of Energetic Particle transport which could set limits on operational scenarios, especially for burning plasmas, and causes damage to the first wall. The quasilinear model proposed by Berk et al.[2] relies on diffusion mechanisms for particle dynamics to captures the evolution of the energetic particle distribution function and the associated mode amplitude. Using the bump-on-tail as a paradigm, we analyze the dynamics near the resonances for accurate diffusion coefficient representation. We verify the model to get the predicted single mode saturation levels and benchmark the case of multimode overlap against particle codes. Using the TAE mode structures computed by the ideal MHD code NOVA, we generalize this method to relax energetic particles' profiles in the full 3D phase space.

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[2]H. L. Berk et al, *Nucl. Fusion*, 35:1661, 1995.

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