Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

One-dimensional energetic particle quasilinear diffusion for realistic TAE instabilities VINICIUS DUARTE, Princeton Plasma Physics Laboratory, Princeton University, KATY GHANTOUS, Laboratoire de Physique des Plasmas, Ecole Polytechnique, France, HERBERT BERK, Institute for Fusion Studies, University of Texas, Austin, NIKOLAI GORELENKOV, Princeton Plasma Physics Laboratory, Princeton University — Owing to the proximity of the characteristic phase (Alfvén) velocity and typical energetic particle (EP) superthermal velocities, toroidicity-induced Alfvén eigenmodes (TAEs) can be resonantly destabilized endangering the plasma performance. Thus, it is of ultimate importance to understand the deleterious effects on the confinement resulting from fast ion driven instabilities expected in fusion-grade plasmas. We propose to study the interaction of EPs and TAEs using a line broadened quasilinear model, which captures the interaction in both regimes of isolated and overlapping modes. The resonance particles diffuse in the phase space where the problem essentially reduces to one dimension with constant kinetic energy and the diffusion mainly along the canonical toroidal angular momentum. Mode structure and wave particle resonances are computed by the NOVA code and are used in a quasilinear diffusion code that is being written to study the evolution of the distribution function, under the assumption that they can be considered virtually unalterable during the diffusion. A new scheme for the resonant particle diffusion is being proposed that builds on the 1-D nature of the diffusion from a single mode, which leads to a momentum conserving difference scheme even when there is mode overlap.

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Date submitted: 08 Jul 2014 Electronic form version 1.4