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Saturation of Alfven modes in tokamaks ROSCOE WHITE, Princeton University, NIKOLAI GORELENKOV, MARINA GORELENKOVA, MARIO PODESTA, Princeton Plasma Physics Lab, YANG CHEN, University of Colorado — The effect of Alfven modes on high energetic particles in tokamaks is important in general, and could be of significance for ITER. This work is a combination of analytic models and numerical simulation to find the saturation levels of unstable Alfven modes and the resulting effect on beam and alpha particle distributions. Solving the drift kinetic equation with a guiding center code in the presence of Alfven modes driven unstable by a distribution of high energy particles requires the use of a δf formalism, wherby the initial distribution f_0 is assumed to be a steady state high energy particle distribution in the absense of the modes, and $f = f_0 + \delta f$ describes the particle distribution in the presence of the modes. The Hamiltonian is written as $H = H_0 + H_1$ with H_0 giving the unperturbed motion, conserving particle energy E, toroidal canonical momentum P_ζ, and magnetic moment μ. By writing the initial particle distribution in terms of these variables, a simple means of calculating mode-particle energy and momentum transfer results, giving a very accurate δf formalism.

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