

Abstract Submitted  
for the DPP11 Meeting of  
The American Physical Society

**Modification of particle distributions by MHD instabilities<sup>1</sup>**

ROSCOE WHITE, Princeton University — The modification of particle distributions by magnetohydrodynamic modes is an important topic for magnetically confined plasmas. Low amplitude modes are known to be capable of producing significant modification of injected neutral beam profiles, and the same can be expected in burning plasmas for the alpha particle distributions. Flattening of a distribution due to phase mixing in an island or due to portions of phase space becoming stochastic is a process extremely rapid on the time scale of an experiment but still very long compared to the time scale of guiding center simulations. In this work we introduce a new method of determining domains of phase space in which good KAM surfaces do not exist, giving exact resonance locations and island widths [1,2]. We use this method for quickly finding the evolution of the particle distribution without carrying out a full guiding center simulation. As examples, profile flattening due to particle avalanche caused by island overlap and large scale flattening of a beam distribution in DIII-D [3,4] due to a large spectrum of low amplitude TAE modes are considered. [1] R. B. White, *Comm. in Nonlinear Science and Numerical Simulations*, CNSNS1906 (2011) [2] R. B. White, *Plasma Physics and Controlled Nuclear Fusion* (2011) [3] R. B. White, N. N. Gorelenkov, W. W. Heidbrink, M. A. Van Zeeland, *Phys. of Plasmas* **17** 056107 (2010) [4] R. B. White, N. N. Gorelenkov, W. W. Heidbrink, M. A. Van Zeeland, *Plasmas Physics Controlled Fusion* **52** 045012 (2010)

<sup>1</sup>DoE grant DE-AC02-09CH11466

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Date submitted: 07 Jun 2011

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