

The Effects of Energetic Ions on Magnetic Islands in Toroidal Plasmas

X.Liu, C.C.Hegna

Dept. of Engineering Physics, University of Wisconsin
Madison, WI 53706

Studies of a kinetic theory for the interaction of an energetic ion population with an isolated magnetic island in a tokamak plasma are presented. Energetic trapped ions can influence the nonlinear dynamics of magnetic islands and excite small scale magnetic islands. The characteristic island width under study is taken to be smaller than the ion banana width. By solving the drift kinetic equation for both electrons and ions, and by considering mechanisms such as ion pressure drift and Landau resonances for the energetic ions, self-consistent equations for the islands' width, w , and its propagation frequency, ω , are determined. The results are to be compared with those for large island width so as to yield a description of magnetic island width evolution from sub-banana width to macroscopic scale lengths.

*Research supported by US DoE under grant No. DE-FG02-86ER53218.