Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Frequency chirpings in Alfven continuum GE WANG, HERB BERK, BORIS BREIZMAN, LINJIN ZHENG, Institute for fusion studies, University of Texas at Austin — We have used a self-consistent mapping technique to describe both the nonlinear wave-energetic particle resonant interaction and its spatial mode structure that depends upon the resonant energetic particle pressure. At the threshold for the onset of the energetic particle mode (EPM), strong chirping emerges in the lower continuum close to the TAE gap and then, driven by strong continuum damping, chirps rapidly to lower frequencies in the Alfven continuum. An adiabatic theory was developed that accurately replicated the results from the simulation where the nonlinearity was only due to the EPM resonant particles. The results show that the EPM-trapped particles have their action conserved during the time of rapid chirping. This adiabaticity enabled wave trapped particles to be confined within their separatrix, and produce even larger resonant structures, that can produce a large amplitude mode far from linearly predicted frequencies. In the present work we describe the effect of additional MHD nonlinearity to this calculation. We studied how the zonal flow component and its nonlinear feedback to the fundamental frequency and found that the MHD nonlinearity doesn't significantly alter the frequency chirping response that is predicted by the calculation that neglects the MHD nonlinearity.

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Date submitted: 14 Jul 2017 Electronic form version 1.4