Effects of the Spatial Extent of Multiple Cyclotron Harmonic Layers[1] J.W. BURBY, G.J. KRAMER, C.K. PHILLIPS, E.J. VALEO, PPPL —
An analytic model for single particle motion in the presence of a wave field and multiple cyclotron harmonics is developed and investigated. The model suggests that even in the absence of Doppler broadening, cyclotron harmonic layers have finite spatial extent. This allows for particles to interact with more than one harmonic layer simultaneously, provided the layers are tightly packed. Evidence that certain NB particles in NSTX experience this effect is presented. A model is then developed for the interaction of a magnetized particle with a pair of cyclotron harmonics. An analytic condition for the onset of strong stochasticity in this setting is then derived. The theory is checked numerically using the full-orbit code SPIRAL. Furthermore, a means for testing its validity experimentally based on the analytic stochasticity threshold is proposed.

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Date submitted: 22 Jul 2011　　　　　　　　　　　Electronic form version 1.4