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Stochastic Threshold in Wave Electric Field Amplitude from Fundamental to High Harmonic ICRF Heating Experiments on C-Mod and DIII-D Tokamak¹ V.S. CHAN, M. CHOI, General Atomics, RF SCIDAC TEAM

— Resonant interaction between ions and ion cyclotron range of frequency (ICRF) wave at arbitrary cyclotron harmonics has been usually treated as a diffusive process in velocity space. This assumes decorrelation in the relative phase difference of wave and ion between successive resonances. In a collisionless high-temperature plasma, the change in trajectory of ions due to the change of energy through the interaction may produce a decorrelated phase. Since the decorrelation of phase difference depends strongly on the combination of applied amplitude of ICRF wave, the wave frequency and the energy of ions, stochastic threshold amplitudes of wave above which non-adiabatic interaction takes place may be very different in fundamental thermal minority ion heating (C-Mod) and high harmonic energetic beam ion heating (DIII-D) cases. We apply the Hamiltonian guiding center drift orbit code ORBIT-RF to study these two different experiments and estimate the dependences of the threshold amplitude for on-set of stochastic interaction of ions.

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