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Combined Parallel Gradient and Collisional Decorrelation Effects in the Absorption of RF Waves

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Abstract

We examine the effects on RF wave absorption of two different types of particle wave resonance decorrelation. These two mechanisms are collisions and parallel gradients in the magnetic field. A careful treatment of collisions shows that in the integrand for the plasma dispersion function there is an interaction term which couples both decorrelation mechanisms. In toroidal fusion devices each type of decorrelation dominates in a certain region of space. Of special interest is the region where magnetic field lines intersect the resonant surface with low angle of incidence. In this region neither decorrelation mechanisms dominates over the other, and the combination of the two produces different absorption physics than either mechanism separately.