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Validation of quasilinear diffusion by electron Landau damping in toroidal geometry XISHUO WEI, Institute for Fusion Theory and Simulation, Zhejiang University, JUNGPYO LEE, Plasma Science and Fusion Center, Massachusetts Institute of Technology — We study the conditions to validate quasilinear diffusion by electron Landau damping in toroidal geometry. As an example, the Landau damping by lower hybrid waves in a tokamak is considered. A particle code is used to calculate particle motion in phase space, and the diffusion coefficient in parallel direction is given by $D_{ql} = \langle \Delta v^2 \rangle / (2\Delta t)$ over a period of time. For simiplicity, the particle motion is perturbed by the electrostatic waves only in the parallel direction, and the perpendicular motion is not taken into account in the diffusion coefficient with the assumption of significantly small gyro-radius and orbit width compared tothe perpendicular wavelength. The variation of parallel velocity due to the varying magnetic field in a flux surface is considered to include the effect of the toroidal geometry on the diffusion coefficient. The calculated coefficient is compared with the theoretical value of bounce-averaged Kennel-Engelmann(K-E) quasilinear diffusion coefficeint. Because the (K-E) diffusion coefficient is derived by the unperturbed particle orbit in a cylindrical geometry, we present some conditions to validate the theory in toroidal geometry. The conditions strongly depend on the variation of parallel velocity, the phase velocity of the wave, and the spectrum of broad band wave.

Xishuo Wei
Zhejiang University

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