Stochastic motion of electrons in the presence of parallel propagating finite amplitude whistler mode waves

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Diffusion processes of electrons have been the main topic to understand radiation belt dynamics. Although the quasi-linear theory for whistler wave modes has been used to model the diffusion processes, a recent test particle simulation pointed out that effects of finite amplitude, which is not incorporated into the quasi-linear theory, can play a significant role in electron diffusion [Saito et al, JGR, 2016]. The purpose of the present study is to model the electron diffusion processes including the effects of finite wave amplitude. By using the Mori projection operator method [Mori, PTP, 1965], we obtain the generalized Langevin equation from the equation of motion of electrons. We discuss to model the dependence of the diffusion coefficients on the wave parameters by using test particle simulation data.