Anomalous Energy Diffusion of Charged Particles by Large Amplitude MHD Waves

Yasuhiro Kuramitsu [1], Tohru Hada [2]

[1] Earth System Sci., Kyushu Univ., [2] ESST, Kyushu Univ

The energy diffusion coefficient evaluated by performing test particle simulations using MHD waves agrees quite well with the value obtained by the quasi-linear theory, as long as the wave power is sufficiently small. However, as the wave power exceeds a certain critical value, the numerically obtained diffusion coefficient tends to be about an order of magnitude greater than the quasi-linear predictions. We discuss this anomalous enhancement of the energy diffusion coefficient in terms of resonant overlapping of trapping regions. Furthermore, we show that the trapping of particles can take place not only around the linear cyclotron resonance but also at a region far from it when a large amplitude wave is present.