29pC05

駆動型無衝突リコネクションに対するガイド磁場の影響
Influence of Guide Magnetic field on Collisionless Driven Reconnection

堀内利得，大谷寛明，宇佐見俊介
R. Horiuchi, H. Ohtani, S. Usami

核融合科学研究所
National Institute for Fusion Science

Because collisionless reconnection is deeply related to microscopic particle dynamics, it is believed to be affected by the existence of guide magnetic field. In order to clarify the influence of guide magnetic field on collisionless driven reconnection, we carry out two-dimensional particle simulation in an open system where external driving field exists. An initial condition satisfies one-dimensional MHD equilibrium with sheared magnetic field as

$$B_z = B_{z0} + B_{z1}\,\mathrm{sech}(y/L),\ \ B_x = B_0 \tanh(y/L)$$

where B_{z0}, B_{z1}, B_0, and L are constants (Fig. 1). It is observed that magnetic islands evolve in a current sheet as a result of magnetic reconnection, independently of guide field strength. Both ion and electron heating in the islands are weakened as guide field increases. This is because strong guide field accumulated inside the islands plays a role in making plasmas magnetized. High energy non-thermal component is clearly observed in electron energy spectrum (Fig. 2), while thermal component is dominant in ion energy spectrum. There is no clear difference in energy spectra with different guide field. This is because electron non-thermal component is mainly used to sustain current density profile. It is also found that the dissipation of magnetic field energy talks place inside narrow electron dissipation region in the vicinity of reconnection point and energy transfer happens mainly between kinetic energy of bulk motion and thermal energy.

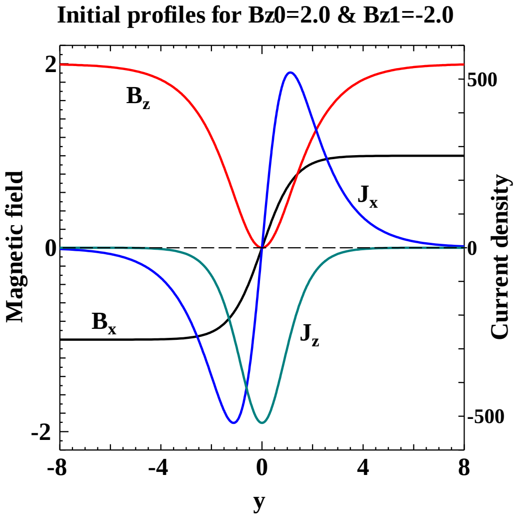

Fig. 1 Spatial profiles of initial magnetic field and current density for B_{z0}=2 B_0 *and* B_{z1}=-2 B_0.

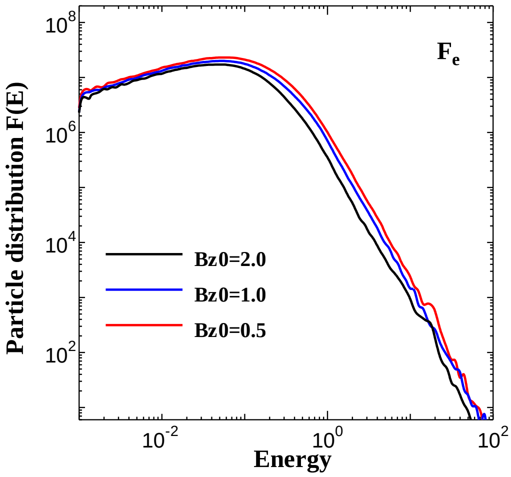

Fig. 2 Electron energy spectrum for different guide field.