Geophysical Research Abstracts
Vol. 12, EGU2010-3814, 2010
EGU General Assembly 2010

High reconnection rate and associated strong electron acceleration in the vortex-induced-reconnection process

Takuma Nakamura, Iku Shinohara, and Masaki Fujimoto
Japan Aerospace Exploration Agency,Kanagawa,Japan (takuma@stp.isas.jaxa.jp)

Magneto-hydrodynamic (MHD) turbulence has often been observed in various regions of space. The MHD turbulence has been an important candidate for the source of non-thermal, high-energy particles. In order to directly understand the particle acceleration process in MHD turbulence, kinetic simulations are necessary to be performed. However, it is impossible to directly solve a large-scale MHD-turbulence by kinetic simulations. In this study, we focused on the fact that the developed turbulence tends to consists of various-scale vortices, and performed full particle simulations on one vortex to understand how particles are accelerated in a vortex. As a result, we found that magnetic reconnection driven by the vortex flow (so-called the vortex-induced-reconnection) can cause the anomalously strong electron acceleration. This is because the reconnection rate of the dynamic vortex-induced-reconnection process is anomalously higher than that of the static reconnection process. In this presentation, we will show the detailed acceleration mechanism of electrons in the vortex-induced-reconnection process, and the results of the parameter survey for the size of the vortex and the magnitude of the vortex flow speed.