Geophysical Research Abstracts
Vol. 14, EGU2012-6140, 2012
EGU General Assembly 2012

Magnetic Islands in the reconnection diffusion region: Cluster observation

S. Y. Huang (1,2), A. Vaivads (2), M. Zhou (3), A. Retinò (4), Yu.V. Khotyaintsev (2), X. H. Deng (1,3), M. André (2), and H. S. Fu (2)

(1) School of Electronic and Information, Wuhan University, Wuhan, China, (2) Swedish Institute of Space Physics, Uppsala, Sweden , (3) Institute of Space Science and Technology, Nanchang University, Nanchang, China , (4) Laboratoire de Physique des Plasmas, Observatoire de Saint-Maur, Saint-Maur-Des-Fossés, France

It is believed that magnetic islands play an essential role in the physics of reconnection diffusion region. They are thought to be very important for the electron acceleration. Nevertheless, there still remain many open questions related to the physics of magnetic islands, mainly because of the very limited number of their experimental in-situ observations. In this presentation, we present the study of the structure and evolution of two neighboring islands in the reconnection diffusion region as observed by Cluster spacecraft. Density dips are observed inside both islands. There is energetic electron fluxes enhancement within the core region only in the second island. Intense currents, which are dominant by parallel component and also have non-neglectable perpendicular current, were observed inside both islands. The non-zero perpendicular current suggests that the islands are not force-free configuration. Estimating the magnetic force and comparing the spatial gradient of magnetic and plasma pressure, we find that both islands are expanding. The core magnetic fields of both islands point in opposite directions, which is first reported and cannot be explained by presently known theories and simulations. We speculate on the possible sources of the differences in both islands. We also discuss the possible electron acceleration mechanism.