Geophysical Research Abstracts, Vol. 8, 02928, 2006
SRef-ID: 1607-7962/gra/EGU06-A-02928

Dynamics of thin current sheets during a reconnection event observed by Cluster

R. Nakamura (1), W. Baumjohann (1), A. Runov (1), Y. Asano (1), A. Balogh (2), C. J. Owen (3), B. Klecker (4), H. Reme (5), A. N. Fazakerley (3)
(1) IWF/OEAW, (2) Imperial College, (3) MSSL, (4) MPE, (5) CESR/CNRS

We have examined the detailed structure of thin current sheets and their evolution during a substorm interval on August 24, 2003, when Cluster experienced several rapid current sheet crossings within a couple of ion gyro times. These crossings took place during an interval of high-speed ion flow with Bz reversals and signatures of accelerated electrons, suggesting crossing of the reconnection region. Multi-point observations within the current sheet and the current sheet profile obtained from the rapid current sheet crossings provided evidence that the full thickness of the current sheet was comparable or less than one ion inertial length lasting at least for several minutes. Comparison between the current density profiles obtained from magnetic field and particle distribution function indicated that we detected the Hall-current flowing into the electron diffusion region as well as the out-flow currents due to inflowing electrons. It should be also noted that a simple quadrupole type Hall-current system of an X-line is only obtained on average, while multiple flux-rope type signatures or transient structures are embedded in the thin current sheets, particularly in regions where signatures of electron acceleration are observed.