



Multi-point observations of magnetotail current sheets during reconnection events

R. Nakamura(1), W. Baumjohann(1), A. Runov(1), Y. Asano(2), M. Fujimoto(3), C.J. Owen(4), B. Klecker(5), H. Reme(6), A.N. Fazakerley(4), E. Lucek(7)

(1) IWF/OEAW (rumi.nakamura@oeaw.ac.at), (2) Tokyo Tech, (3) ISAS/JAXA (4) MSSL (5) MPE, (6) CESR (7) Imperial College

Magnetic reconnection is a fundamental process in space plasmas and is selected as one of the key science topics in the planned Cross Scale mission. The importance of such multi-point multi-scale mission is demonstrated by showing examples from the four-point measurements of thin current sheet by Cluster during reconnection events in the Earth's magnetotail. In particular, we focus on reconnection events with a large guide field. Strong guide field cases in magnetotail reconnection have been rarely reported so far, since on average a guide field is not expected to play a central role in the magnetotail. Yet, some local (temporal) fluctuations and tilt of the current sheet may create an effective guide field and associated signatures are detected in the electron distribution and the structure of the current sheet. These 3-D temporal/local events with less than minute-scale were observed during a longer lasting thin current sheet interval showing X-line signatures (reversal from tailward flows with negative B_z to Earthward flows with positive B_z) on average. Whether these average X-line signatures are due to a large-scale X-line or just manifestation of many transient reconnection signatures is difficult to resolve in the current measurements. These observations therefore suggest that in order to understand the reconnection it is essential to examine these transient small scale signatures in a larger context of thin current sheet development, which requires multi-scale multi-point observation planned in Cross Scale mission.