Geophysical Research Abstracts, Vol. 9, 09642, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-09642

In-situ evidence of magnetic reconnection in turbulent plasma using four-spacecraft Cluster observations

A. Retinò (1), D. Sundkvist (2), A. Vaivads (1), F. Mozer (2), M. André (1), C.J. Owen (3)

(1) Swedish Institute of Space Physics, Uppsala, Sweden (2) Space Sciences Laboratory, University of California, Berkeley, USA (3) MSSL, University College, London, UK

Magnetic reconnection and turbulence are two topics which are very important for understanding the conversion of electromagnetic energy in laboratory and astrophysical plasmas. Despite the fact that reconnection has been widely observed at large-scale boundaries such as the terrestrial magnetopause or the magnetotail neutral sheet, it has not been known whether reconnection occurs and is important in turbulent plasmas where many small-scale boundaries can form. We show, for the first time, evidence of magnetic reconnection in turbulent plasma by using Cluster four-point measurements in the magnetosheath downstream of the quasi-parallel shock. We show that reconnection is fast and converts electromagnetic energy into heating and acceleration of charged particles of the turbulent plasma. Our observations cannot fully resolve the intricate cross-scale aspect of reconnection. We discuss the cross-scale properties of reconnection in turbulent plasmas and suggest how future multi-spacecraft measurements could improve our current understanding of turbulent reconnection.