Geophysical Research Abstracts, Vol. 7, 02840, 2005
SRef-ID: 1607-7962/gra/EGU05-A-02840

Non-force-free modeling of flux ropes in the plasma sheet and comparison with RAPID/Cluster high energy particle observations

T. Mulligan (1), J. B. Blake (1), J. L. Roeder (1), J. F. Fennell (1), R. Friedel (2), and P. Daly (3)

(1) The Aerospace Corporation, Los Angeles, CA (Tamitha.Mulligan@aero.org; JBernard.Blake@aero.org; James.L.Roeder@aero.org; Joseph.F.Fennell@aero.org); (2) Los Alamos National Laboratory, Los Alamos, NM (friedel@nis.lanl.gov); (3) Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau, Germany (daly@linmpi.mpg.de)

The large separation distances of the Cluster spacecraft provide a unique opportunity to probe the 3-dimensional geometry of plasmoids in the plasma sheet region of the magnetotail. Employing a well-tested, non-force-free and non-cylindrically symmetric flux rope model we invert magnetic field data from the fleet of Cluster spacecraft simultaneously to obtain the magnetic geometry and current densities of observed flux ropes in the near-Earth tail. We compare the model current densities with observations and interpret resulting non-force-free characteristics, such as compression of the flux rope leading edge in terms of plasma pressure gradients, possibly due to bursty bulk flows. We also probe energetic electron and ion composition in the vicinity of the flux rope with the RAPID/Cluster instrument and determine how flux rope radial width and 3-dimensional geometry relate to injections of high energy particles in the surrounding plasma environment.