Concerning magnetic helicity using CLUSTER magnetic field data

G.Kleindienst (1), K.-H. Glassmeier (1)

(1) Institute for Geophysics and extraterrestrial Physics, Technical University of Braunschweig
(Email: g.kleindienst@tu-bs.de/Fax: +49-531-391-5220)

Magnetic helicity is considered as an interesting parameter to study turbulence and energy transfer in plasma systems because the total helicity is an invariant of a system. The basic definition of magnetic helicity is given and its essential properties are presented with respect to its calculations based on real measurement data. The topological interpretation of the helicity is concisely introduced to understand the practical consequences for its in-situ determination.

The estimation of a linear spatial gradient of the magnetic field vector from CLUSTER measurements is presented and the resulting consequences and restrictions for the determination of magnetic helicity from measured data are discussed. The general application of these findings for other missions than CLUSTER is discussed.