Geophysical Research Abstracts, Vol. 7, 06098, 2005
SRef-ID: 1607-7962/gra/EGU05-A-06098

Solitary electromagnetic waves in an ion beam-plasmas: Application to CLUSTER foreshock observations.

K. Sauer (1), E. Dubinin (1), M. Fraenz (1), Ch. Mazelle (2) and J.F. McKenzie (3)

(1) Max-Planck-Institut für Sonnenphysik, Katlenburg-Lindau, Germany, (2) CESR/CNRS Toulouse, France, (3) UC Riverside, USA.

The properties of stationary, fully nonlinear waves in a plasma with an ion beam propagating parallel to the magnetic field are studied in the framework of Hall-MHD. In contrast to earlier work, the waves are not restricted to parallel propagation. In addition to beam-driven oscillitons which manifest the steady nonlinear configuration in which the linearly unstable system evolves, obliquity allows a new class of solitary structures which arises due to the resonant coupling between a soliton and a wave which co-exist in a restricted region of phase velocities. These so-called "rippled solitons" exhibit characteristic structures which represent a superposition of Hall-MHD solitons determining the large-scale variation and a wave which generates the fine structure. By numerical solution of the governing structure equations examples of the different types of solitary electromagnetic waves (SEW) are given. Observed phenomena in the foreshock of Earth, mainly by CLUSTER are analyzed with respect to SEW's.Especially, the momentum flux conservation is tried to prove.