Geophysical Research Abstracts,
Vol. 11, EGU2009-326, 2009
EGU General Assembly 2009

A new phase pattern recognition tool applied to field line resonances

F. Plaschke (1), K.-H. Glassmeier (1), S. E. Milan (2), I. R. Mann (3), U. Motschmann (4), and I. J. Rae (3)

(1) Institut für Geophysik und extraterrestrische Physik, TU Braunschweig, Germany, (2) Radio and Space Plasma Physics Group, Department of Physics and Astronomy, University of Leicester, United Kingdom, (3) Department of Physics, University of Alberta, Edmonton, Canada, (4) Institut für Theoretische Physik, TU Braunschweig, Germany

The detection and characterization of geomagnetic pulsations (standing Alfven waves on magnetospheric field lines, as produced by the field-line resonance (FLR) process) using ground magnetic field data has been based for decades on the interpretation of the longitudinal and latitudinal distributions of pulsation amplitudes and phases. By adopting this approach only clear and single FLRs can be correctly analyzed. Magnetometer array data, however, contain much more phase information due to the coherency of the ground observed FLR wave structures across the array of stations, which remains undisclosed if phase pattern recognition of beamforming techniques are not used. We present theory and applications of such a new phase pattern recognition tool, the Field-Line Resonance Detector (FLRD), which is an adaptation of the wave telescope technique, previously used in seismology and multi-spacecraft analysis. Unlike the traditional methods the FLRD is able to detect and fully characterize multiple superposed or hidden FLR structures, of which the tool allows for an automated detection. We show results of its application in a statistical analysis of one year (2002) of ground magnetometer data from the Canadian magnetometer array CANOPUS (now known as CARISMA, www.carisma.ca) and a comparison of FLRD results with other ground-based data from optical and radar instruments. The remarkable adaptability of the tool to other datasets and phase structures shall also be discussed.