MODEL OF COMPRESSIONAL WAVES IN THE LOW-LATITUDE PLASMA SHEET OF THE EARTH MAGNETOSPHERE

O. P. Verkhoglyadova

Taras Shevchenko Kyiv National University
(*6, Academician Glushkov Prosp., Kyiv 03127, Ukraine*)

S u m m a r y

Low-frequency compressional waves of the Pc 4 ¯ 5 frequency range are observed by the INTERBALL probe in the middle tail of the Earth magnetosphere. These waves are connected with large-scale vortical motions of plasma. A theoretical model is proposed to explain typical features of these waves. Coupling of drift Alfven and magnetosonic waves is considered by introducing small disturbances of the magnetic field along a local field line. New items of the current work as compared with [7], are consecutive inclusion of finite compressibility of plasma and disturbed ion motion along the local field line. In limiting cases, the derived equations are reduced to the well-known Kadomtsev ¯ Pogutse and Hasegawa ¯ Mima equations. Partial solutions take the form of vortices. Magnetosonic solitary waves are obtained in the super-Alfvenic wave regime. In general, the coupling of nonlinear Alfven waves and nonlinear magnetosonic waves takes place. According to the proposed model, two-dimensional vortical motion of a plasma transversely to the local field line is accompanied by nonlinear magnetosonic waves propagating in flux tubes along field lines. The model gives a possibility to explain specific properties of the Pc 4 ¯ 5 waves in the low-latitude plasma sheet of the Earth magnetosphere, that are recently studied experimentally.