

## **The magnetospheric and ionospheric disturbances during the passage of the large-amplitude Alfvén wave in the interplanetary medium**

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Observations in the solar wind and magnetosphere, as well as ground-based observations have been used to determine relationship between disturbances in the solar wind and different regions of the magnetosphere and ionosphere in period of 12-24 UT, December 17, 1990. In this period the IMP-8 spacecraft observed oscillations of the north-south ( $B_z$ ,  $V_z$ ) components of the interplanetary magnetic field and the solar wind velocity with dominant period of about 40 min. On the basis of a variance matrix analysis it is shown that the correlated oscillations of the north-south components of the interplanetary magnetic field and solar wind velocity are caused by the passage the nonlinear (large-amplitude) Alfvén wave. At the same time, geosynchronous satellites observed the correlated oscillations of the magnetic field and the fluxes of protons in the magnetosphere. In the case under study the statistical properties of the magnetospheric magnetic field fluctuations are similar in most respects to properties of solar wind magnetic fluctuations. We show that in the magnetosphere, in contrast to the solar wind, the fluctuations are those of magnetosonic type. This is due to the difference of directions of the regular magnetic field in the solar wind and magnetosphere. Ground-based magnetic data also show the existence of similar periodicity. Significant differences between statistical properties of the day-time and night-time variations are found. We conclude that statistical properties of ground-based magnetic variations depend on the region of the observation and connected with different mechanisms of energy transfer from the solar wind to different regions of the magnetosphere and ionosphere.