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Transparency for Cosmic Radio Waves due to decrease of the density of the Ionosphere caused by Acoustic Waves

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Increase of the transparency for cosmic radio waves due to decrease of the density of the ionosphere caused by acoustic waves is the object for discussing in this article. Ultra low frequency acoustic wave (ULF), which excited by source in the lithosphere, brings influence into the density of F-layer of the ionosphere. This phenomenon takes place jointly with the increase of the transparency caused of the periodic structure in the ionosphere in E-layer created by extremely low frequency (ELF) acoustic wave, which has been confirmed experimentally. Simulations of this phenomenon are presented here. In our first theoretical and experimental investigation [1], we have analyzed and observed two phenomena of increase of the transparency for cosmic radio waves caused by period structure in the ionosphere E-layer and the decreasing of density of plasma in the F-layer. From our experimental results [1], it is clear that: the altitude was about 160 km and working time is about 60 s so as it is shown in this work we observed the effect of decreasing density of plasma.

Observation time and the altitude gave a combined effect. Each effect had the same intensity. For resolving two effects, it is necessary to provide new experiments with different altitudes between 60 km and 300 km. The first phenomenon [1] was caused by periodic structure of acoustic extremely low frequency (ELF) acoustic waves in the E-layer. The second one, considered in this article, was caused by the decrease of the plasma density and Langmuir frequency of electrons $\omega_{pe} = (4\pi e^2 n/m_e)^{1/2}$ where all parameters connect with electron charge e, the electron concentration n,

and electron mass m_e. ULF acoustic waves, excited by sources in the lithosphere, influence the density of the F-layer of the ionosphere and may cause the decrease of the density of plasma and the increasing of the transparency for cosmic radio waves. Such a phenomenon takes place jointly with the increase of the transparency caused by the periodic structure in the ionosphere created by ELF acoustic wave, which has been confirmed experimentally too.

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1. Kotsarenko N., S. A. Soroka, S. V. Koshevaya, V. V. Koshovy, Phys. Scripta, V.59, p174-181 (1999)