THE PROPAGATION OF THE PLANETARY - SCALE WAVE DISTURBANCES IN THE IONOSPHERE

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Abstract

Using the analogy method the frequencies of new modes of electromagnetic planetary-scale waves (with wavelength 10^3 km and more) having weather forming nature are found at different ionospheric altitudes. This method gives a possibility to determine a spectra of ionospheric electromagnetic perturbations directly from the dynamic equations without solving the general dispersion equation. It is shown, that the permanently acting factor - latitude variation of the geomagnetic field - generates fast and slow weakly damping planetary electromagnetic waves in both E and F layers of the ionosphere. The waves propagate eastward and westward along the parallels. The fast waves have phase velocities $(1-5)km/s$ and frequencies $10^{-1}-10^{-4}s^{-1}$. The slow waves propagate with the velocities of local winds and have frequencies $10^{-4}-10^{-6}s^{-1}$. The waves generate geomagnetic pulsations of magnitude of order of hundred nanoTesla. The properties and parameters of the theoretically studied electromagnetic waves are in agreement with those of large-scale ultra-low frequency perturbations observed experimentally in the ionosphere.

Key words and phrases: Ionospheric plasma; planetary waves; inhomogeneous geomagnetic field.On the new modes of planetary-scale electromagnetic waves in the ionosphere.

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