

# **THE MEASUREMENTS OF IONOSPHERE PLASMA ELECTRON DENSITY BY THE KHARKIV INCOHERENT SCATTER RADAR**

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The ionosphere plasma characteristics are responding on variations of solar and magnetic activity. The method incoherent scatter (IS) of radio waves allows determining experimentally both regular variations of the basic parameters ionosphere, and their behavior during perturbation.

The equipment and measurement technique, developed by authors, are allows obtaining certain data about behavior of an ionosphere during various origin and intensity ionosphere perturbations. The Kharkiv IS radar is the only and high informative facility for research ionosphere plasma at European midlatitudes. The Institute of ionosphere IS radar located near Kharkiv, Ukraine (geographic coordinates: 49.6°N, 36.3°E, geomagnetic coordinates: 45.7°N, 117.8°E). The radar is operate with 100-m zenith parabolic antenna at 158 MHz with peak transmitted power of ~2.0 MW.

The double-frequency measuring channel mode with compound sounding signal was employed for experiments. That provided ~ 20-km resolution in range ~100–400 km and ~100-km in range ~200–1100 km. The measuring channel consists of a two-channel transmitter, antenna, radiowaves propagation medium - ionosphere, receiver and correlator. The composite signal, which is formed from two radio pulses - large duration and small duration. This method has allowed essentially reducing an error of the electron density determination in region of an electron density maximum and below. The temperatures and ion densities were estimated by comparing experimental and theoretical auto-correlation functions.

It is presented experimentally obtained altitude and spatial-temporal dependences of electronic density of ionosphere plasma in the heights range a 100-1000 km during typical seasons in quiet geomagnetic conditions for the period of low Solar activity. The comparing of the measured variations of ionosphere plasma electron density with to calculated on IRI-2001 model is adduced. There is of principle convergence on character of the altitude and temporal variations with model and experimental results, obtained on Kharkiv radar. It is can be explained that model is constructed on database western hemisphere (for example American IS radar chain). It is first, during strong magnetic storms the powerful signals of midlatitude coherent echo are registered by IS radar and their spatial, temporal and spectral characteristics are analyzed.

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