

# **Diagnostics of artificial ionospheric disturbances by method of pulse sounding**

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Experimental results of diagnostics of artificial disturbances in the ionosphere by means of sounding by short probing radio pulses are presented.

Experiments were carried out at the heating facilities “Zimenki” and “Sura” in Nizhny Novgorod region, Russia. Different parameters of the artificially disturbed ionosphere were derived from characteristic analysis of the observed signals: “caviton” signal (G.I.Terina, J.Atm.Terr.Phys., 1995, v.57, p.273) appearing in the F ionosphere layer in the reflection region of the powerful radio wave, signals scattered by periodic artificial irregularities arising in the standing wave field of powerful radio emission in the E region ionosphere, the main or the mirror reflected signal of the probing transmitter.

Recording of the time dependencies of the amplitude and phase of the scattered “caviton” signal under the same polarization of the heating and probing radio waves and their near frequencies ( $\Delta f < 200$  KHz), allowed to obtain information about dynamics and the travel velocities of caviton formations arising in the reflection region of the heating wave at different stages of the ionospheric heater.

Study of the time phase characteristics of the main signal of the probing transmitter with above-mentioned correlation of heating and probing parameters showed the traverse velocities of the reflection region of the probing and heating radio waves during the heating of the ionosphere and after the heater turning off.

The observed data about the traverse velocities of the heating reflection region were obtained also under the phase recording of signals scattered by periodic artificial irregularities (PAI) under the measurements of electron density by the resonance scattering method of radio waves on PAI (G.I.Terina, J.Atm.Terr.Phys., 1996, v.58, p.645) when the heating and probing transmitters operated with different frequencies and polarization.

The recording of the amplitude of signals scattered on PAI in the process their formation and relaxation allowed to define the disturbances of electron temperature caused by heating of the lower ionosphere in the height range 95-125 km where the basic mechanism of PAI formation is thermal one.