

Detection of wavelike disturbances by means

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Results of systematic observations of maximum observed frequency ($\dot{I}OF$) variations on two mid-latitude oblique chirp sounding paths of Cyprus (34.5°N, 33°E) - Rostov - Don (47.3°N, 39.7°E) and Inskip (53.8°N, 2.8°W) - Rostov – Don are presented. Observations were carried out round-the-clock in January - June and October – December 2005. In measurements was used two channel chirp sounder, sweep frequency was 100 kHz/s. For Cyprus the frequencies range of radiation was 8-30 MHz, for Inskip it was 4.2-30 MHz. The ionograms were recorded every 5 minutes. In the automated mode more than 150000 ionograms is processed.

It is shown that values of $\dot{I}OF$ are undergone quasiperiodic variations with periods from 30 minutes to two hours. The spectral analysis of $\dot{I}OF$ variations is carried out. On the basis of analysis of spectral power of MOF fluctuations the following conclusions are made: spectrum of MOF fluctuations has a pronounced discrete structure independently of distance and orientations of path that testifies on wavelike disturbances (WLD) propagation in the ionosphere; the basic spectral harmonics on both paths are concentrated in frequencies of 0.00015-0.0003 Hz (the periods are 3000-6700 s); the spectral structure of MOF fluctuations is changed essentially from day to day though some spectral components can be present at spectra of MOF fluctuations during several day; it is not revealed a seasonal dependence of the WLD occurrence.

We have carried out also the analysis occurrence of the WLD detected on high angle ray ionograms as moving "cusps" and have determined their period according to observations on a Cyprus - Rostov – Don path where this effect was displayed most brightly. It is obtained that typical values of WLD periods responsible for "cusps" formation on oblique sounding ionograms make 15-30 minutes. The occurrence of WLD with such periods well correlates with sunrise and sunset conditions for mid-point of path. In these hours the probability of WLD occurrence reaches 90-100 %.

Modeling propagation of radio waves at presence of traveling ionospheric disturbances is carried out. It is shown that conditions of "cusps" formation on high angle ray are rigid enough. The "cusps" arise only at presence of medium scale disturbances (length of a wave of 100-150 km) at relative amplitudes of 15-20 % and at propagation under angles to a plane of horizon from - 60° up to - 45°.

