

Experimental Monitoring of the Parameters of the Ionosphere in the Local Area Using the Results of Multifrequency GNSS-Measurements

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Abstract : In recent years, much attention has been paid to the problems of ionospheric disturbances and their influence on the signals of global navigation satellite systems (GNSS) around the world. This is due to the increase in solar activity, the expansion of the scope of GNSS, the emergence of new satellite systems, the introduction of new frequencies and many others. The influence of the Earth's ionosphere on the propagation of radio signals is an important factor in many applied fields of science and technology. The paper considers the application of the method of transionospheric sounding using measurements from signals from Global Navigation Satellite Systems to determine the TEC distribution and scintillations of the ionospheric layers. To calculate these parameters, the International Reference Ionosphere (IRI) model of the ionosphere, refined in the local area, is used. The organization of operational monitoring of ionospheric parameters is analyzed using several NovAtel GPStation6 base stations. It allows performing primary processing of GNSS measurement data, calculating TEC and fixing scintillation moments, modeling the ionosphere using the obtained data, storing data and performing ionospheric correction in measurements. As a result of the study, it was proved that the use of the transionospheric sounding method for reconstructing the altitude distribution of electron concentration in different altitude range and would provide operational information about the ionosphere, which is necessary for solving a number of practical problems in the field of many applications. Also, the use of multi-frequency multisystem GNSS equipment and special software will allow achieving the specified accuracy and volume of measurements.

Keywords : global navigation satellite systems (GNSS), GPstation6, international reference ionosphere (IRI), ionosphere, scintillations, total electron content (TEC)

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