



## **The correction of the tropospheric refraction effect in satellite measurements**

**V.M. Smirnov, A.V. Smirnov**

Institute of a radioengineering and electronics of the Russian Academy of Science

141190, Fryazino, sq. B.A. Vvedenskogo, 1

vsmirnov@ire.rssi.ru

Radioengineering methods of measuring coordinates and transmitting exact time to the systems with the use of satellites allow to achieve global and continuous support of solving problems in satellite navigation and geodesy. In Earth surface measurements of satellite motion parameters it is necessary to take into account the effect of radio wave propagation conditions in the Earth atmosphere (troposphere and ionosphere) on the accuracy of measurements.

The procedure is intended to correct tropospheric refraction effects in high-precision determination of ground control points and in the satellites navigation and geodesy using radio engineering tools, in conducting geophysical investigations. It allow to realize practically the highest precision of an error correction in determination of radionavigation parametrs caused by the influence of conditions of radiowave propagation through the atmosphere.

Numerical simulation for real altitude profiles of the index of refraction showed that the first stage of the method allows taking into account the Earth troposphere influence on radioengineering measurements of range at zenith angles less than 80 degrees to an accuracy of 1.4 m, while for the second and third stages the accuracy is 0.4 and 0.06 m, respectively. It follows from the simulation results that a minimum discrepancy between the measured and forecasted (residual error) tropospheric refraction influence were 3.7 and 01 m, 1.1 and 0.04 m, and 0.2 and 0.006 m for stages 1, 2 and

3, respectively. No absolute analogs of the procedure exist today.