Estimation of Meansquare Errors in Measurements of Radio Navigational Parameters

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Abstract. It is often necessary to evaluate the performance of the user's navigational equipment or its compliance with the requirements of the technical task by its measurments. One of the indicators of the quality of the user's navigational equipment is the root-mean-square error of the radio navigation parameters.

The article presents a methodology for estimating the root-mean-square errors in the measurements of radio navigation parameters obtained by the user's navigation equipment installed on a spacecraft. The issues of a representative sampling of the number of measurements for determining the mean square errors of measurements, eliminating the mutual dynamics of the navigational satellite and user's navigational equipment, the dynamics of the receiver time scale shift, as well as the ionospheric component of the measurements are considered. The method includes an estimate of the instability of the receiver reference oscillator.

Based on the technique, the experimental estimates of the root-mean-square errors in pseudo-range measurements by code and the carrier phase are made. Application of the developed technique allows evaluating the quality of the user's navigation equipment and the correspondence of its characteristics to the specified criteria.

Keywords: GLONASS, GPS, radio navigation parameter, mean-square error