

## Method for Hardware Error Evaluation of the Onboard Navigation System of LEO Satellites in GNSS Pseudorange Measurements by Carrier Frequency Phase

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**Abstract.** When using the onboard satellite navigation equipment (SNE) of LEO spacecraft, there arises a problem of getting adequate evaluation of the hardware errors of SNE by real results of navigation observations without a reference orbit or measurements. This article proposes a technique of hardware error evaluation of pseudorange measurements of the carrier frequency phase received by the onboard SNE installed on LEO satellites. Hardware error of the mentioned measurements is determined indirectly by the so-called double differences of the initial measurements, which make it possible to rule out the overwhelming portion of systematic errors.

The results of applying this technique on two particular samples (S1, S2) of measurements with durations of 5 hours each for one of Russian spacecraft similar to spacecraft of the JASON space system are presented. Evaluation of phase measurement accuracy was performed for radio signals in the frequency ranges L1, L2 of GLONASS navigation satellites.

**Keywords:** navigation systems, navigation measurements, evaluation of measurement accuracy, LEO satellite, hardware errors, double differences