INFLUENCE OF THE CURVATURE OF RADIO-SIGNAL TRAJECTORY IN NEUTROSPHERE ON THE RADIAL VELOCITY OF SATELLITE

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The article considers the effect of refraction of the Earth's atmosphere on the radial velocity of the satellite, determined by the results of unsolicited differential Doppler trajectory measurements. The aim of the study is to conduct a comparative analysis of errors in the results of these measurements caused by the influence of neutrosphere refraction with errors caused by the hardware accuracy of modern Doppler receivers. To achieve this aim, formulas were obtained that allowed for various zenith distances to estimate perturbations of the satellite's radial velocity caused by the curvature of the trajectory of electromagnetic oscillation propagation in the Earth's neutrosphere. For this assessment, an approximation model developed earlier by the author was also used, which allows determining the length of a curved section of the trajectory of an electromagnetic oscillation in the neutrosphere. In addition, according to the formulas obtained in the work, the absolute errors of measuring the difference frequency and the radial velocity due to the error of counting the number of cycles of the difference frequency by Doppler receivers were estimated. Based on the analysis of the experimental data obtained, the conclusion is made: at the stage of mathematical processing of the results of unsolicited differential Doppler trajectory measurements of satellites, it is necessary to take into account the perturbations of its radial velocity caused by the curvature of the trajectory of the radio signal propagation in the Earth's neutrosphere.

Keywords: satellite, differential doppler measurements, radial velocity, refraction, neutrosphere, curvature of the radio signal trajectory, approximation model of the radio signal trajectory, difference frequency

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