

UDC 621.396.965.8 EDN OCAWRX

Substantiation of Requirements for the Accuracy of Navigation, Orientation and Parameters of the Spacecraft Survey System Based on Photogrammetry Methods

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Abstract. The main requirements for spatial data are reliability, efficiency and timeliness of their acquisition. The implementation of these requirements can be achieved by ensuring the necessary accuracy of geo-linking of target information (images) obtained from Earth remote sensing spacecraft. To formulate the requirements for the accuracy of navigation and orientation of the spacecraft, it is proposed to apply a mathematical model of average square errors corresponding to the determination of spatial coordinates by the method of direct photogrammetric serif for an arbitrary surveying case: for any values of the elements of the external orientation of the surveying system. The error model takes into account 22 parameters. The problem is solved for the most common systems of external orientation angles (Euler angles). The proposed approach makes it possible to determine the contribution of any group of parameters (or a separate parameter) to the final error in determining spatial coordinates for a given orbit of a spacecraft, to choose the optimal combination of error values corresponding to different groups of parameters and thereby form requirements for the accuracy of navigation and orientation of the spacecraft, requirements for the survey system.

Keywords: spacecraft, navigation error, orientation error, spatial coordinates geolocation

For citation: Bezmenov V.M. Substantiation of Requirements for the Accuracy of Navigation, Orientation and Parameters of the Spacecraft Survey System Based on Photogrammetry Methods. *Rocket-Space Device Engineering and Information Systems*. 2025. Vol. 12. No. 1. P. 30–41.

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Received 09.10.2024

Accepted 23.01.2025