

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Mobile Satellite Communications and Navigation Technology (1)

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THE POSSIBILITY OF USING THE DIFFERENTIAL CORRECTION MODE FOR NAVIGATION
SUPPORT OF UNIVERSITY SATELLITES

Abstract

Recent years have been characterized by a sharp increase in interest from universities and small businesses to create low-cost micro/nanosatellites and their constellations for solving of different tasks. Increasingly, these satellites are used for rather complex experiments requiring precision positioning and time reference of the experiments results. However, usually a limited budget does not allow for to use expensive on-board navigation receivers. In this paper has been investigated the possibility of an approach to improve the accuracy of the navigation solutions using the principles of differential correction. It suggests the use of a ground station, geographic coordinates of which are known with high accuracy, where also set the same navigation receiver. The integrated algorithm which processes together onboard and ground-based navigation measurements obtained during the visibility séance of the satellite are discussed. It uses assumption that navigation solutions in both navigation receivers define for the same constellation of navigation satellites. Processing pseudo-distances for navigation satellites, obtained in the navigation receiver, using the exact coordinates of the ground station and ephemerides of navigation satellites, possible find the model parameters of the ionosphere delays. By expanding this model to the pseudo-distances received in the onboard receiver, can compensate the majority of the ionosphere disturbances. This approach can also be used to eliminate the effect of other kinds of the errors. The simulations showed that the navigation accuracy can be increased by 3-5 times. Describes an experiment which is planned on AIST-1 microsatellite created in Samara State Aerospace University.