

The Remote Sensing Satellite navigation System on the Basis of Global Positioning System GPS and GLONASS

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Abstract

A revolution in spacecraft guidance, navigation and control technology has started with Global Positioning System (GPS) and (GLONASS) to autonomously provide spacecraft position, attitude and time information. This new technology is being applied to spacecraft constellations to achieve the precision formation flying required for many proposed science and commercial missions. These innovations will also result in significant reductions in weight, power consumption, and cost for future spacecraft attitude and orbit determination systems. Applications of (GPS/ GLONASS) receivers have proliferated well beyond the original vision of its system architects. Receivers are now being built which can provide absolute measurements such as translational position, velocity, time, as well as attitude and attitude rate. Moreover, technology is emerging which will make GPS and GLONASS receivers capable of routinely delivering highly accurate measurements for most of these states. Thus GPS and GLONASS receivers hold the promise of satisfying nearly all the guidance, navigation and control (GN&C) sensing requirements for Earth orbiting spacecraft in a single integrated, reliable, low mass, low volume, and low power package. In this paper the procedure of refinement and prognostication of the spacecraft motion parameters, without the use of differential equation of motions is investigated. The considerable decrease of volumes of memory and time of the solution of the navigation problem are required to attain, the integration of the system of the differential equation of motions or use of a dynamic filtration method on board. For the solution of the navigation problem it is proposed to use a priori data obtained by GPS/ GLONASS receivers about the nature of a change in the osculating element of the orbit. The proposed procedure of solution algorithm of the navigation and employing developed block diagram of navigation are comprised and precision characteristics are obtained.