SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Mobile Satellite Communications and Navigation Technology (5)

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ADDITIONAL OPPORTUNITIES FOR CARRYING OUT OF SHORT TERM EXPERIMENTS ON SOYUZ ORBITAL STAGES: COMMUNICATION AND NAVIGATION PROBLEMS

Abstract

For the rockets deducing payloads into closed orbits, there is a possibility of their use for carrying out of short-term experiments up to an instant of their enter in dense layers of an atmosphere and combustion. For example, they can be used for testing of working capacity of electronic a component in space. However in these case orbital stages make uncontrolled movement and thus there are problems with their navigation and maintenance of communication with the Earth. In the report possibilities of navigation of an orbital step on signals GLONASS/GPS systems, as well as possibilities of use low-orbital satellite communication system GlobalStar for information transfer to the Earth are investigated. The complex mathematical model considering movement of carrier rocket orbital step, dynamics of its movement, dynamics of navigating and communication satellites is created. Numerical research of a problem on the example of orbital stage of a Soyuz carrier rocket launching on a low orbit with a perigee of 190 km and apogee of 240 km (a typical orbit is executed at orbiting of the cargo vehicle Progress for maintenance of ISS). Struck root, that for reception of the navigating decision visibility of an unchangeable grouping from not less than 4 navigating satellites current of two minutes and visibility of the satellite of system GLOBALSTAR not less, than 5 minutes are sufficient. It is shown, that in view of known features of dynamics of Soyuz orbital stage, carrying out of short-term experiments during all time of flight with frequency of the decision of a navigating problem and a possibility of information transfer to the Earth not less often than an once on an orbit is possible.