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SUGGESTIONS ON TESTING OF TECHNOLOGY FOR DETECTING SPACE DEBRIS BY
ADVANCED ORBITAL SPACE SYSTEMS ONBOARD THE ISS RS

Abstract

The concept of reducing the cost of spacecraft production and launching develops into the concept of providing space-based services to the users. It causes a skyrocket growth of near-Earth space (NES) exploration by commercial companies. Optical means located throughout the globe are used to ensure operational, continuous and observation of objects in medium-high, highly elliptical and geosynchronous orbits. The drawback of optical means is the dependence on weather conditions in the location area. Considering the increase in the number of hazardous situations the inability of online update can lead to critical consequences due to the impossibility of prompt response to a dangerous situation. We currently working on options for development orbital constellations for observation of space debris that are free of the above disadvantages of ground means. It seems appropriate to test the proposed technologies using optical means onboard the ISS RS for final concept formation of the system of orbital observation of space objects. It is possible to transmit surveillance data almost continuously to the mission control center by using the existing broadband communication equipment. Technology maturation for the rapid acquisition and processing of information, solving the issues of updating the orbit parameters, as well as verifying the information acquired is possible by implementing the operational interaction of the head data bank in the MCC and International Scientific Optical Network in KIAM RAS. We propose a smart 'digital twin of the NES' based on multi-agent technologies which is considered as a direction of future. The digital twin will afford real time access to the history and position and assess the current state of each space debris object. In the method proposed, each object will be supplied with its own software agent. This agent will collect and accumulate information about its object from various sources and provide the specified actions for planning and modeling the dynamics of its state and movement to warn the object owner about the collision hazards. The report presents the main principles of technology elaboration for the space debris detection using optical means onboard the ISS RS. The report provides a technology for automated data exchange between the ISS RS and the head data bank of scientific information and promising functions and architecture of the digital platform. The main aspects of verification of the information obtained by orbital means according to the data of optical means for monitoring of space objects are considered in the report.