

## FEATURES OF THE DEVELOPMENT OF MEANS FOR SPACECRAFT REMOVAL FROM NEAR-EARTH OPERATIONAL ORBITS

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A search for optimal solutions in the development and making of means for spacecraft removal from near-Earth operational orbits is the key problem in the solution of the global problem of space debris in near-Earth space. Taking into account the trend to the build-up of space debris in near-Earth orbits, the Inter-Agency Space Debris Coordination Committee every year takes a number of measures aimed at searching for the most advantageous engineering solutions on the development of efficient means for space debris removal from operational orbits. This paper analyzes the features of the development of optimal means for spacecraft removal from near-Earth operational orbits. The main efficiency criteria in the development of optimal methods and means for spacecraft deorbit are as follows: minimizing the space debris deorbit time, increasing the reliability of space debris deorbit means, and minimizing the propellant and power consumption for space debris removal.

Taking into account the above optimization criteria, the paper presents a comprehensive analysis of existing methods and means for space debris removal from low-Earth orbits and shows their anticipated advantages and drawbacks. Three basic tasks of missions aimed at space debris removal from near-Earth space are identified. A fourth task of space debris removal from near-Earth space, which has resulted from the evolving new concept of in-orbit space debris processing with the use of in-orbit service spacecraft and platforms, is identified and substantiated too. A multicriteria comprehensive comparative analysis of the best known concepts of the development and making of means for space debris removal from near-Earth orbits is presented. The features of the development of combined space debris deorbit means based on several existing methods for active and passive space debris removal from low-Earth orbits are considered. The principal aim of the development of combined hybrid space debris deorbit means of this type is a search for engineering solutions that would meet the above-mentioned efficiency criteria as closely as possible.

The comprehensive multicriteria analysis of the currently available means for space debris removal from low-Earth orbits and the features of the development of hybrid space debris deorbit means demonstrates the advisability of further studies along this line.

**Keywords:** *space debris deorbit means, near-Earth operational orbit, optimization criteria.*

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