

CHOICE ORBITS FOR SPACE DEBRIS UTILIZATION

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The increasing technogenic pollution of near-Earth space with space debris fragments of various sizes significantly limits the possibilities for space activity and is a great threat to objects on the Earth. Low orbits with altitudes up to 2,000 km are the most heavily polluted. The urgency of ensuring space flight safety in conditions of the technogenic pollution of near-Earth space and reducing the threat to objects on the Earth from the uncontrolled entry of space objects into the dense atmosphere and their fall to the Earth is rapidly growing. In accordance with the guidelines of the Inter-Agency Space Debris Coordination Committee, space debris fragments must be removed from the area of operational orbits. Currently, the following methods are considered as promising ways to remove space debris: a direct descent from the orbit, a transfer to an orbit with a life shorter than twenty-five years, a transfer to a burial orbit, and in-orbit utilization. In accordance with the concept of in-orbit utilization, space debris is considered as a resource for the in-orbit industry. The aim of this paper is to assess the prospects for space debris in-orbit utilization and to develop a technique for choosing the number and spatial location of safe low-Earth utilization orbits. The paper overviews and analyzes modern approaches to cleaning near-Earth space from space debris and mathematical models of near-Earth space pollution. The technique developed made it possible to identify possible areas for safe space debris utilization orbits. The energy consumption for transferring space debris objects from their original orbits to utilization ones is estimated. What is new is the technique and recommendations for the choice of the number and spatial location of space debris utilization orbits. The results obtained may be applied in planning the in-orbit utilization of space debris.

Keywords: *space debris, removal, burial, utilization, mathematical simulation.*

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