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IAF SPACE OPERATIONS SYMPOSIUM (B6)
New Space Operations Concepts and Advanced Systems (2)

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TECHNICAL CONCEPT OF TRANSPORT SPACECRAFT INTENDED FOR ON-ORBIT SERVICING

Abstract

At the present time, space servicers are being designed to perform the following functions: - satellites insertion to target orbits in case of their inaccurate insertion; - prolongation of satellites in-orbit lifetime by means of their orbits correction or propellant refilling; - deorbiting or transfer of exhausted satellites (large-sized space debris) to graveyard orbit; - on-orbit inspection and maintenance. Profitability is the main parameter of the servicer development reasonability. The profitability is the ratio of total profit due to all services to cost of development, manufacturing, launching and operation of the servicer. At the same time, certain services provide an income for the servicer operator. On the other hand, doing some service requires a certain propellant supply for the servicer maneuvers for transfer into the orbit of a satellite to be serviced, orbital rendezvous and docking. Obviously, the larger propellant supply is on the servicer, the more services can be done and, therefore, the bigger income can be obtained. However, increasing the propellant supply causes increasing the servicer dimensions and mass of the servicer systems. This results in increasing of costs for the servicer manufacturing and launching, and its profitability will be reduced. Thus, there is a need of optimization of quantity of services that the servicer shall do during its lifetime. Based on such an analysis of economic effectiveness, the technical concept of servicer is developed.