

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
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DEVELOPMENT ANALYSIS OF ON-ORBIT SERVICE AND MAINTENANCE APPLICATION

Abstract

Space mission had the characteristics of high cost and high risk, and would lead to inestimable loss in case of no orbit or irreparable failure after orbit. Therefore, countries attached great importance to the development of on-orbit service technology, and had carried out a lot of research and test work, trying to achieve efficient service to the on-orbit spacecraft. Space on-orbit service involved on-orbit assembly, maintenance, function upgrading and service missions of satellites, platforms, auxiliary modules of space station and space vehicles, or other platforms, which could significantly prolong their service life and improve their capability, and had broad application. In the future, when the business development model of on-orbit service became mature, the design concept of space system may be completely changed. In this paper, the characteristics of docking mechanism, rendezvous orbit design and propulsion system in the two commercial satellite on-orbit service practices of MEV were analyzed, and the business scope of on-orbit service was defined. Furthermore, combined with the technical reserves and the demonstration objectives of on-orbit operation, the development trend of on-orbit service was researched from two aspects of developing more adaptable docking mechanism and commercial market prospect of on-orbit service in this paper. The development ideas of space transportation service system was put forward, and it mainly included: 1) develop multi-functional space transportation platform to optimize the service mode and configure multi-functional service modules, and provide diversified customized services. 2) multi-functional space transportation platform to provide ferry services with carried satellite orbit transfer to enhance the flexibility of carrying. In view of the large deviation of launch vehicle into orbit, the research on the retention upper stage or multi-function space transportation platform as the in orbit fault plan of launch vehicle was carried out. 3) in order to effectively reduce the cost of entering space and development space, the functional development of multi-mission adaptability and the expansion of transportation range

of the upper stage was carried out, and the advantages of orbit retention resources of the upper stage was brought into full play.