

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Technologies for Future Space Transportation Systems (5)

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STRATEGY OF LARGE-SCALE AND LOW-COST ACCESS TO SPACE IN THE FUTURE

Abstract

Development of human society increases the demand of more and more frequent space missions of larger scale. This results in new demand of scale increase and cost decrease for access to space. Therefore, it is of great value to study strategy of large-scale and low-cost access to space in identifying future development trend and promoting technology progress. The objective of this study is to identify future payload requirement for large-scale and low-cost access to space, and the solutions and strategy to satisfy such requirement, as well as the related key technologies. In this study, the space mission requirement and value analysis of large-scale and low-cost access to space in the future are specified firstly, including LEO missions, robotics and human deep space exploration, space infrastructure construction, space tourism and on-orbit service and maintenance. Four problems are pointed out for current expendable launcher technology utilized to meet the mission demand of large-scale and low-cost access to space: limited payload capabilities, inadequate adaptability and flexibility, long launch cycle, and high cost. Three technical approaches for large-scale and low-cost access to space are proposed including low-cost design of expendable launch vehicles and reusable launch vehicle (RLV), interface standardization, and new concept of launchers. The related key technologies are analyzed as well. To enable large-scale and low-cost access to space in the future, aerospace transportation revolution is necessary and the era of aerospace transportation revolution is coming, which has the following characteristics: multi-time increased carrying capability, magnitude-lower cost (1/5-1/10), intelligence, airline flight mode of launching, flexibility and responsiveness, industrialization, significant impact on human society and life.