SYMPOSIUM ON STEPPING STONES TO THE FUTURE: STRATEGIES, ARCHITECTURES, CONCEPTS AND TECHNOLOGIES (D3)
Infrastructures and Systems to Enable International Future Exploration and Utilization of Space (3)

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STUDY ON TECHNICAL APPROACH FOR MANNED DEEP SPACE EXPLORATION BASED ON SPACE RENDEZVOUS AND DOCKING

Abstract

This paper analyses the development trends of the major international manned deep-space exploration program and the manned deep-space exploration technology, studies the combinations of manned lunar excursion and the needs of launch scale, analyses the present conditions of space transportation system and its future development, based on the safe and reliable near-earth orbit rendezvous and lunar orbit rendezvous technology, presents 9 kinds of manned lunar excursion technical program , such as launching a direct lunar excursion, repeatedly launching near-earth orbit rendezvous combination of repeatedly launching lunar orbit rendezvous and launching near-earth orbit and lunar orbit rendezvous, and according to the requirements of carrying capacity, emission frequency, the number of rendezvous and docking, project scale, technical complexity, difficulty in development and safety and reliability, pointing out the developing direction of the manned deep-space exploration of different countries and regions based on the present technology. The main conclusions of this study is that insisting on "separation of people and goods," "the development of new, large and heavy launch vehicles," " minimizing the launches and docking times" is the basic criteria of the future large-scale manned deep space exploration; Taking full advantage of the current rockets and manned space technology to realize the combination of unmanned lunar exploration and manned space flight such as making pre-research and demonstration of key technology of the rendezvous and docking of manned lunar landing, which is the natural choice for countries to undertake a manned moon landing task; Using present mainstream 20t-class large-scale launch vehicle to develop 40t or 60t grade level larger launch vehicles and to realize near-earth orbit rendezvous and lunar orbit rendezvous techniques, is the realistic way to implement the limited-size manned lunar excursion; Making a breakthrough in large-scale engine technology, developing 150t-class heavy launch vehicle, developing new launch vehicles are the only way to carry out large-scale development of the moon, build a lunar base, and make deep-space exploration.