

Ground-Based Preparatory Activities (11)
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DESIGN OF JOINT TEST SYSTEM FOR SPACE STATION AND VISITING SPACECRAFT

Abstract

Aiming at the verification requirements of interaction between space station and visiting spacecraft, a configurable and scalable closed-loop joint test system is proposed. Through effective electrical performance testing techniques and methods, static and dynamic tests are carried out for on-orbit flight. The interface matching, information transmission correctness, and flight timing coordination are fully tested. On the one hand, the system can support synchronous testing and cooperative interaction of multiple spacecrafts to form a dynamic closed loop; on the other hand, the system simulates the information, energy, and Environmental parameters of the visiting spacecraft, and forms a test loop with the space station to realize the simulation of the visiting aircraft. Through test and verification, the system can support multiple modes of verification, and the test process moves forward, improving the parallelism of testing and development, and effectively solving the multi-spacecraft collaborative verification requirements. 1. Closed-loop test system supporting information exchange between space station and visiting spacecraft. An integrated spacecraft information interactive test system is designed, which unifies the power, bus, positioning and signal simulation of each spacecraft, and establishes a real-time synchronous excitation and feedback system to realize the dynamic closed loop between the spacecraft. It realizes the simulation of working conditions during the rendezvous and docking and assembly flight, and verifies the coordination and matching of wireless communication, docking separation, bus communication and energy grid connection. 2. Combined flight cycle charging and discharging system. Based on the on-orbit flight mode, a multi-supply power supply system simulating solar energy conditions was designed. An adaptive multi-power synchronous control method was

designed to realize the synchronous charging and discharging cycle simulation of the combined body, and the energy balance design of the combined flight was verified. 3. Multi-spacecraft joint test and interface verification technology based on semi-physical simulation platform. An inter-spacecraft electrical interface simulator based on semi-physical simulation platform was designed to centrally control various simulators to verify the electrical interface and dynamic process between spacecraft.