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REVIEW OF MICRO-GRAVITY SIMULATION EXPERIMENTAL SYSTEM OF SPACE
MANIPULATOR AND PRELIMINARY ASSUMPTION OF NEW EXPERIMENTAL SYSTEM**Abstract**

The use of space manipulators instead of astronauts to complete dangerous space operations or assisting astronauts to complete some complex space tasks is a research hotspot in the field of aerospace technology. Through the computer virtual simulation, all the characteristics of the space microgravity environment cannot be completely simulated. If only relying on the computer simulation under ideal conditions to design and finalize the space manipulator, it is likely to lead to the failure of the whole work. The time and money invested in a space mission are extremely large, and once the mission fails, it will cause irreparable losses. Often a space mission is invested in a lot of time and money, once the mission fails, it will cause irreparable losses. Therefore, the ground verification test of space manipulator is extremely important. The simulation technology of space microgravity environment has also become the key of space technology. The purpose of this paper is to summarize the application scope, advantages and disadvantages of various space manipulator experimental systems, and to provide a reference for the development of a three-dimensional, high-precision space manipulator microgravity test system.

The main contents are:

1. This paper introduces the microgravity test system of space manipulator, compares the drop tower experiment system, parabolic flight, suspension system, air-bearing planar systems, neutral buoyancy experiment system and hardware-in-the-loop micro-gravity experiment system, and summarizes the application scope, advantages and disadvantages of these test systems.

2. This paper analyzes the ground test methods and equipment of the microgravity experiment system of space manipulator, expounds the key technologies needed for the development of these experimental systems, and puts forward suggestions for the development direction and improvement scheme of these experimental systems.

3. A preliminary idea of a new type of space robotic microgravity test system combining the advantages of hardware-in-the-loop micro-gravity experiment system and neutral buoyancy experiment system is proposed. This system is designed to verify the capture of free-floating targets by the space robotic arm.

The innovation of this paper is to summarize the key technologies needed to develop a space manipulator microgravity test system, and provide a reference for researchers to develop and improve the test system.