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ANALYSIS AND VERIFICATION OF COOLING SYSTEM LEAKAGE FAULT OF MANNED SPACECRAFT

Abstract

The fluid loop radiator, as the heat dissipation device of large spacecraft, is installed on the outermost surface of the spacecraft. Micro-Meteoroid and orbital debris(MMOD) may possibly penetrate the fluid loop radiator tube, causing a leak in the cooling medium, which results in the failure of the spacecraft's cooling system. This paper takes spacecraft as the research object, in which the MMOD calculation model of radiator is established, and the protection capability of radiator is obtained. The manned spacecraft carried out a round-trip mission to space station. The fault mode of radiator was analyzed, and the whole ship thermal balance test was carried out.The test proves that when the cooling system leakage of manned spacecraft occurs in the docking space station, both in the high and low temperature conditions, the equipment and the ambient temperature can meet the requirements. When the cooling system leakage of manned spacecraft occurs in the autonomous flight, measures such as shortening the flight time and reducing the heat consumption of the spacecraft, etc. the equipment temperature can meet the requirements and the safe return of astronauts can be guaranteed.