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ANALYSIS OF MAINTAINABILITY REQUIREMENTS OF SPACECRAFT CONTROL SUBSYSTEM

Abstract

Due to the complex control strategies and algorithms of the spacecraft control subsystem, and the interaction between measurement and actuator devices and various states, various types of failures occur in orbit inevitable. In order to reduce the impact of the spacecraft control system failures, it is necessary to study the maintainability of the attitude and orbit control subsystems. This paper proposes maintainability requirements for mature satellite platforms in orbit from three aspects, including: component failure or orbit deviation satellite maintenance interface requirements; capture and takeover requirements through satellite cooperative measurement; module replacement or functional expansion, performance upgrade requirements of devices on-orbit. The modular design of the repairable satellite control subsystem is required. This paper proposes three key technologies for modular design, including the uncertainty of dynamic parameters in the maintenance service process, intelligent configuration of control system parameters, and high-precision attitude control module parameter calibration, and corresponding ground verification methods are given. The research results of this paper have important reference value for the performance upgrade, life extension and mission expansion of spacecraft.