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Space Structures II - Development and Verification (Deployable and Dimensionally Stable Structures) (2)

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DESIGN AND GROUND TEST OF THE ISOLATOR FOR SATELLITE ATTITUDE CONTROL ACTUATOR

Abstract

Improvement of image acquisition capability, agility and cycle revisit capability are the goals of agile remote sensing satellites. However, higher capability of payload and higher agility bring new challenges to the satellite structure and control system. Among them, the vibration caused by the attitude control actuators with high-speed rotor is a troublesome and urgent problem to be settled, for the reason that such vibration will significantly affect the performance of the payloads. Sensors used for high capability satellites are highly sensitive to the vibration and even the micro-g lever vibration will affect the image quality.

This paper is focused on the vibration isolation of reaction wheel and control moment gyro (CMG) and introduces the measurement to suppress the vibrations produced by these actuators. In this paper, a dynamic model of the CMG disturbance vibration is established and a 6-DOFs passive isolation platform with three isolation spring is developed. With the help of optimization method, the isolators are designed and series of ground tests are carried on the isolator to verify its performance.

Results show that the vibration isolator effectively decreases the disturbances caused by CMG, and the reduction ratio of the vibration delivered to the basement is higher than 80%.