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MODELING AND SIMULATION OF A MICRO-VIBRATION ATTENUATING SYSTEM BASED ON FLEXIBLE SATELLITE MODEL

Abstract

One of the most important factors that affect the performance of precision payloads in the satellite is the micro-vibration generated due to static and dynamic unbalanced forces of high-speed rotary equipments. Due to the characteristic of low damping in the satellite structure, these micro-vibrations have long decay time and degrade the performance of precision payloads, particularly. For analyzing the influences of the micro-vibration due to CMGs module on the performance of precision payloads, a flexible satellite structure model is developed by using finite element method in this paper. For effective attenuating the micro-vibration from CMGs module, a parallel octo-strut isolation platform is provided. In the model, the damping component of the parallel octo-strut isolation platform is represented by a three-parameter dynamic model. Based on the model, the attenuating effect of the parallel octo-strut isolation platform on the micro-vibration of CMGs module is investigated. In addition, the influences when one or two struts failed on the isolation performance of the platform are also studied. The analysis results show that the influences of the micro-vibration from CMGs module on the precision payloads in the satellite can be effective attenuated by the parallel octo-strut isolation platform, and the platform have a high reliability.