IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Interactive Presentations - IAF MATERIALS AND STRUCTURES SYMPOSIUM (IP)

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ACTIVE VIBRATION CONTROL OF FLEXIBLE APPENDAGES OF SPACECRAFT IN DURING ATTITUDE MANEUVER

Abstract

Owing to stringent task requirements and weight savings, appendages structures (solar panels and antennas) of the spacecraft are becoming lager and more flexible, hence vibration problem has become an important issue for the stability of the system. Since the inherent frequencies of the spacecraft with flexible appendages are becoming lower, conventional frequency band separation method would not be effective to eliminate the effects of vibration. This paper investigate active vibration suppression of the flexible appendages of spacecraft in during attitude maneuver. Dynamic equations of a satellite model with two solar panels are established by considering rigid-flexible coupling effect. Piezoelectric materials are adopted as actuators to control the flexible appendages. LQG and H control laws are designed to realize active vibration suppression during different attitude maneuvers of the spacecraft. The results indicate that the vibration of the appendage has been efficiently suppressed, therefore the altitude stability of the spacecraft is also improved.