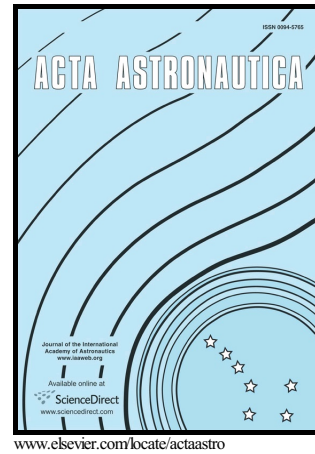


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Design and analysis of a moment control unit for agile satellite with high attitude stability requirement

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Abstract: A moment control unit is developed and verified by numerical simulation. This moment control unit is employed as an actuator for the satellite attitude control. It contains four control moment gyroscopes (CMGs) to realize the rapid attitude maneuver and a vibration isolation system for each CMG. This unit can not only reduce the required electronics for each CMG and thus the weight, but also improve the stability of the satellite attitude. The design of the structure is presented first. This structure not only holds and protects the CMGs, but also isolates the vibrations caused by each CMG. Then, a dynamic model of a single CMG with a vibration isolation system is formulated, and the time- and frequency-domain characteristics of this dynamic model are discussed. Numerical simulations of a satellite attitude control example are then used to evaluate the system. The new moment control unit occupies less volume than previous designs, and the results show that the new design improves satellite pointing performance because of the vibration isolation.

Key words: control moment unit; vibration isolation; control moment gyro; attitude control

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