

Reaction wheel configurations for high and middle inclination orbits

ABSTRACT

The purpose of this paper is to identify the low-power Reaction Wheel (RW) configuration for a 3-axis satellite attitude control at high and middle inclination orbits. All of the proposed RW configurations are evaluated through the numerical simulations with respect to an identical reference mission. The simulations are tested for two different orbit positions; first, at a high inclination (e.g., 83°), second, at a middle inclination (e.g., 53°). All configurations are analysed in terms of their total torques and attitude performances. The stable attitude accuracies ($\approx 0.001^\circ$) are achieved in all the configurations either at 83° or 53° inclinations. Results also revealed that the change of orbit inclination slightly influences the determination of the low-power RW configurations. This research provides a quick summary on a possible low-power arrangement of reaction wheels onboard a small satellite.

Keyword: Reaction wheel; Satellite attitude control; Control torque