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SOLID PROPELLANT BASED MULTI-BURN CAPABLE CUBESAT PROPULSION

Abstract

A novel concept for a solid propellant-based modular propulsion unit with multi burn capabilities is presented for CubeSat orbit maneuvering. This empowers the CubeSat to increase operating range by performing complex maneuvers and inclination changes in less time than state of the art CubeSat electric propulsion units. The modular system is equipped with a self-sustained ignition unit and a spring-based separation system to eject the dead mass after completion of the burn of each module. To enable standard interfaces with the existing CubeSats, a universal data interface is implemented to control the propulsion unit by enabling or disabling the unit through an onboard computer. To ensure the stability of CubeSat during the burn phase, a self-sustained spin stabilization system is integrated with the propulsion unit to perform spin and de-spin maneuvers. Further, the self-burning housing structure possibilities are also investigated to mitigate the debris problem because of ejectable modules.