

Micro-Satellite Configuration of Discoid and Asymmetrical, Gyroless with Thrusters Three-Axis Robust Control and Stability Analysis

Ho-Nien Shou *

Department of Aviation & Communication Electronics, Air Force Institute of Technology,
Kaohsiung, Taiwan, R.O.C.

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Abstract

The center of mass of the micro-satellite can offset due to fuel consumption in the course of propulsion, with the interference of external orbital environment such as gravity gradient torque and solar radiation torque. If the structural shape is discoid and asymmetrical, the attitude control may be difficult. The only solution is to design a robust controller, so that the attitude pointing of the satellite can meet the mission requirements with the interference of internal parameter perturbation and external disturbance. Meanwhile, in order to reduce the weight and manufacturing cost of satellite, in the design of satellite attitude angular rate determination, the project used unscented kalman filter (UKF) algorithm, coarse sun sensor (CSS) and earth horizon sensor (EHS) as measurement components to obtain the satellite attitude without rate gyro.

Keywords: H_∞ controller, unscented kalman filter, coarse sun sensor, earth horizon sensor.

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* Corresponding author. E-mail address: longlifeshow@xuite.net

Tel.: +886-7-625-8738; Fax: +886-7-625-6530