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NOVEL CUBESAT TEST SETUP VALIDATING SATELLITE ATTITUDE DETERMINATION AND CONTROL

Abstract

This paper proposes a novel ground test setup for satellite attitude determination and control using an LQR-based LQI controller. Solid models of all components are created, the subsystems of a nanosatellite, including four reaction wheels and inertial sensors, are modeled, and simulated using modelbased software environment. Nonlinear system dynamics and kinematics are linearized using Taylor Series. A sensor and embedded Kalman filter are included, and a linear model is controlled utilizing LQR based LQI controller. Simulation studies are successfully conducted, and the LQI controller is found suitable for the desaturation of reaction wheels. The proposed ground test setup provides a low-cost and effective alternative to traditional airbed setup for space education and practical application.