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Implementation and testing of B-Dot algorithm on CubeSat 2U nanosatellite prototype

Andrei SPATARI, Vladimir MELNIC, Maxim KAPUSTEANSKI, Alexei MARTÎNIUC

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Abstract

This paper presents the design and testing of an attitude determination and control system (ADCS) for a 2U CubeSat prototype, using magnetorquers and the B-dot algorithm. The choice of this solution is motivated by the low power consumption and low mass, compared to reaction wheels. The proposed system integrates hardware components (STM32 microcontroller, MPU9250 sensor, communication and data storage modules) and a software architecture capable of implementing the B-dot algorithm for angular velocity reduction and satellite orientation. Experimental results show that the algorithm enables the stabilization and reorientation of the prototype, but with a relatively long response time, caused by the low magnetic moment of the coils. The study highlights the feasibility of the solution, but also the need to optimize the magnetorquers design to improve performance.

Keywords: *b-dot algorithm; magnetic field; magnetic torque; magnetorquer; power supply; wireless communication*

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