INTRODUCTION

The Hawaii’s Space Flight Laboratory (HSFL), at the University of Hawai’i at Mānoa, has a state-of-the-art Attitude Determination and Control System (ADCS) testbed sized for microsatellites ranging from 50 to 100kg. A new attitude-dynamics simulator and testing platform, sized for CubeSats, was required to verify the ADCS of a 3U CubeSat mission under development. Prior developments of CubeSat sized three-axis simulators include a spherical air bearing, support platform, and mass balancing system [1, 2].

MOMENT OF INERTIA

In order to effectively test and verify how the actuators and algorithms of an ADCS will operate in orbit, it is necessary to replicate the rotational dynamics experienced in space. Such an endeavor includes matching the moment of inertia (MoI) of the testing assembly to that of the satellite mission, in addition to replicating the near-frictionless rotation and torque free environment of space.

PROBLEM & OBJECTIVE

Current CubeSat ADCS testing methods do not consider the MoI of a specified mission, and thus do not provide a complete assessment of how an ADCS will operate once in orbit. The goal of this project was to develop a testing assembly capable of replicating the complete rotational dynamics, with a MoI of ±20%, of a 3U CubeSat in orbit. This project was motivated by the request to test and verify a CubeADCS unit, sold by CubeSpace, which will be used in a 3U CubeSat under development by HSFL.

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REFERENCES
