IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Space Structures - Dynamics and Microdynamics (3)

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DEVELOPMENT OF REACTION WHEEL BALANCING PLATFORM FOR NANOSATELLITE APPLICATION

Abstract

The development of satellite subsystems or the integration (AIT) phase require the procurement of specific means (electrical and mechanical ground support equipment, Emulator systems...) to support certain activities, identify the performance of equipment to be embedded, check the accuracy of instruments and calibrate them, also validate the expected orbital functionalities required in the satellite mission. This means are generally designed to support certain activities or to emulate the mission functionalities. In our case we have started in satellite integration department (D-AIT) the development project of an academic satellite, with commercial-off-the-shelf system (COTS) and homemade equipment and their test benches and platforms (GSE), which are necessary to implement our development plan. Tn this work we focus on the balancing of the reaction wheels to be embedded in nanosatellite to control their attitude. To answer to this task, a specific platform has designed and realized (in house) regarding the limited project budget and covering the academic character of the mission. as is known balancing is a necessary process for rotating or rotor machines, in order to rectify asymmetry deviations resulting from the machining process or/and and the accumulated tolerances when assembling the pieces of the system. For satellites, the system nominally concerned is the reaction wheel (RW). During attempts to generate, according to a profile, angular moments (kinetics) by the RWs of the satellite, certain undesirable effects related to the imbalance of the system were observed at high speeds. Based on the principle of balancing and the used standards, this work describes the development of reaction wheel balancing machine (hardware, firmware and software, a user manual and a test procedure) and the phase of post development covering the reaction wheel balancing of the academic satellite.