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QBITO, A CUBESAT TO STUDY THE LOWER THERMOSPHERE

Abstract

QBITO is the first CubeSat developed by Universidad Politécnica de Madrid (UPM). It is a 2U CubeSat and is one of the satellites that compound the project QB50 lead by Von Karman Institute (VKI) in Belgium. The main task of QBITO will be to operate the Ion Neutral Mass Spectrometer (INMS) which is the primary payload on-board the CubeSat and which will study the properties of the lower thermosphere. The most outstanding feature of QBITO is the amount of new in-house developments that are present in the design. These include the Structural Subsystem, the Electrical Power Subsystem, the Communications Subsystem and a novel Antenna Deployment Mechanism. These new developments are complemented with Commercial Off-The-Shelf units in order to reach a robust, yet innovative, architecture. Apart from the INMS, QBITO will carry three other payloads in order to take advantage of the mission as much as possible. The first is an experiment that will assess the performance of the Docosane as a Phase Change Material. It is being developed in collaboration with the University of Liège. The second experiment, the Medium Wave Infrared Detector, is developed by the Spanish company New Infrared Technologies and aims at testing a novel kind of uncooled detectors, in space conditions. Finally, the third additional payload, developed at UPM is the Experimental Software. It implements an attitude determination and control algorithm based on fuzzy control theory. The purpose is to test the suitability of this kind of control technique for spacecraft attitude control applications. The test activities started in 2015 and have continued until 2016. The environmental tests include thermal-vacuum tests, vibration tests and shock tests. These activities done during the AIT phase of QBITO, and the main results will be presented.