OUFTI 1 & OUFTI 2

Attitude Determination and Control System

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1 Introduction

In 2016, The university of Liege developed the first nanosatellites ever made in Belgium : OUFTI-1 and OUFTI-2. The satellite is led by students supported by professors much like our University's SatDev program. OUFTI-1 is a 1U cubesat and is the first satellite equipped with the amateur radio digital-communication protocol: the D-STAR technology. Other experiments that will be aboard OUFTI-1 are an innovative electrical power system as well as high-performance solar cells. The satellite is not required to point in one specic direction and the Attitude Determination and Control System (ADCS) subsystem relies on Passive Magnetic Attitude Stabilization (PMAS). The rst part of this thesis presents this design made of a permanent magnet and hysteretic bars. The magnet orients the satellite along the Earth's magnetic eld lines and the hysteretic bars damp its rotational velocities. The inuence of the magnet on the hysteretic bars as well as the nite elongation of the bars are carefully studied. OUFTI-2 is the next satellite in the series. Its size is planned to be twice the size of OUFTI-1 and its main payload will be a radiometer to perform a direct measurement of the net heating of the Earth. The radiometer is developed in cooperation with the Royal Meteorological Institute of Belgium and is called Sun-earth IMBAlance (SIMBA) radiometer. The second part of this master thesis focuses on the feasibility study of an active attitude control system which satises the requirements of the payload.