

## **COMPARISON BETWEEN TWO DIFFERENT WAYS OF ATTITUDE DETERMINATION IN THE NANOSATC-BR CUBESAT**

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Nanosatellites, such as the CubeSats, have been used for many scientific space applications. The NANOSATC-BR is a CubeSat nanosatellite that is being developed mainly by undergraduate students from the Federal University of Santa Maria (UFSM), Santa Maria, Rio Grande do Sul (the Brazilian southeast state), who are developing Scientific & Technological Initiation projects at the Southern Regional Space Research Center (CRS/INPE – MCT). One of the objectives of this mission is to observe and measure the Geomagnetic Field module, which does not require attitude information. Some space missions like that of NANOSATC-BR may not require attitude determination and control, but any available information about the attitude is always important for monitoring the behavior of any satellite in orbit. The NANOSATC-BR has a magnetometer that observes the geomagnetic field in the satellite body frame. However, it would be impossible to fully determine the attitude of the nanosatellite, which is tumbling roughly in a torque-free motion, only based on Geomagnetic Field measurements. There are many kinds of attitude sensors that could be considered in order to provide additional attitude information. One is the Solar Sensor, which has a precision of about 1° in stable orbit conditions. As a possible alternative to conventional attitude sensors one could take data from the solar panel of the CubeSat nanosatellite. By observing the current output of the solar panels one may evaluate approximately the incidence angle of Sun rays. The aim of this work is to do a comparison between the attitude determination precision obtained through the magnetometer data combined with the solar panel incidence angle and through the magnetometer data combined with solar sensor observations. Expectedly, the first approach allows a quite poor three-axis attitude determination compared with the accuracy of the second one. The investigation intends to be a contribution to next development steps related to the NANOSATC-BR.

CubeSat nanosatellite, attitude determination, NANOSATC-BR

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