20th SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Generic Technologies for Nano/Pico Platforms (6B)

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DETERMINING POSITION, ROTATION AND ORIENTATION FOR TETHERED TWIN NANO SATELLITE TO MAP DATA FROM AN INTERFEROMETER.

Abstract

Nanosat projects pose a relatively cheap and flexible method to obtain knowledge of space, the universe and the technologies needed for future investigations. One of the current frontiers of our knowledge is low frequency radio astronomy (below 30 MHz). On earth LOFAR is measuring these signals, however the atmosphere, ionosphere and interference make space a better place for measurements. TwenteSat is a nano satallite student project which aims to bring two satellites in low earth orbit (LEO) attached to each other by a tether and together forming an interferometer. The practical, technological and measurement knowledge obtained may be used for future projects such as the OLFAR (Orbital Low Frequency ARray). TwenteSats' satellite system will initially start as one satellite (10x10x30cm) and once in orbit change to two 10x10x10cm units connected by a tether. The interferometer will use two dipole antennas and is therefore direction sensitive. These antennas will be in line with or parallel to the tether and thereby have a donut shaped radiation sensitivity pattern with the tether in the middle of the donut. Rotation will be used to hold the nanosats apart by centrifugal force thereby also rotating the direction of the measurement. In order to map the data it is therefore necessary to know the orbit altitude, satellite system rotation and the satellite system orientation relative to earth. To determine these parameters the usage of GPS, measurements from earth and measurements on the nanosat itself will be discussed in general. These measurements will be conducted such that it is not necessary to know the altitude before they take place. In this paper different system level approaches to determine these variables will be discussed for a nanosat platform.