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THE IN-ORBIT CALIBRATION PLAN FOR THE ACCELEROMETER OF THE MICROSCOPE SPACE MISSION

Abstract

The MICROSCOPE space mission aims at testing the Equivalence Principle (EP) with an accuracy of 10e-15. This principle is one of the basis of the General relativity theory; it states the equivalence between gravitational and inertial mass.

The test is based on the precise measurement of a gravitational signal by a differential electrostatic accelerometer which includes two cylindrical test masses made of different materials. The accelerometers constitute the payload accommodated is on board a drag-free microsatellite which is controlled inertial or rotating about the normal to the orbital plane with a very stable angular velocity.

The acceleration estimates used for the EP test are disturbed by the instrument's physical parameters and by the instrument environment conditions on board the satellite. These parameters are partially measured with ground tests (for instance in the case of electronics parameters) or during the integration of the instrument in the satellite (alignment). Nevertheless, the ground evaluations are not sufficient with respect to the EP test accuracy objectives. An in-orbit calibration is therefore needed to characterize them finely.

After a general description of the MICROSCOPE space mission and the instrument, the paper will describe the specific procedures which are planned to be implemented in orbit for the calibration and the simulation software. The numerical results obtained with the software will be discussed.