

Structured accelero-stellar estimator for Microscope drag-free mission

MICROSCOPE is CNES fourth microsatellite based on MYRIADE platform. Its mission is dedicated to the test of the Equivalence Principle (EP) with an improved accuracy of 10-15. Therefore the satellite attitude requirement is very stringent and the payload accelerometric measurements have to be used in the control and estimation loop. This paper deals with one of the most critical issue in MICROSCOPE attitude and acceleration control: the accelero-stellar hybridization in rotating mission mode. Non-smooth H infinity optimization algorithms have been used to design structured and fixed order estimators, leading to the same performances as the full-order reference estimators, with a huge gain in computation efficiency. These structured estimators have then been selected to replace the reference ones and will be operating on board the satellite in 2016. This paper presents the reference estimators, gives the design procedure used for the structured ones, and shows their compared performances and robustness.