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Author: Mr. Manuel Rodrigues

Office National d'Etudes et de Recherches Aérospatiales (ONERA), France, manuel.rodrigues@onera.fr

EQUIVALENCE PRINCIPLE TEST WITH MICROSCOPE AND PRELIMINARY RESULTS

Abstract

Launched in April 2016, the MICROSCOPE satellite ended its operations in October 2018. Onera is responsible for the instrument developpement, production and test. In addition, it is also responsible for the science and the mission science center which deals with the science operations and data process. The objective of the mission is to test the Equivalence Principle (EP) with 10^{-15} accuracy. The EP is the corner stone hypothesis of the General Relativity (GR) established by Einstein in 1917 leading to the universality of free-fall. For more than 2 years the satellite has collected usefull scientific data. In December 2017, the first results were published on the base of only 120 orbits available data, improving by one order of magnitude the best laboratory results.

After the deployment of two wings in October 2018, the de-orbitation of MICROSCOPE started. The final results deals now with more than 2000 orbits of scientific data helped by more than 500 orbits of instrument characterisation to establish the systematic errors. A particular focus will be made on the treatment of glitches on the measurement data mainly produced by the satellite MLI cracking. This cracking occurs when the parts of the satellite are more or less enlightened by the Sun or the Earth. Their temporal distribution is in competition with a potential EP violation signal and have to be removed. The paper presents the strategy to clean the data without impacting the evaluation of such signal. At the time of the presentation, some preliminary results may be presented prior to the final release of data.