

MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)  
Gravity and Fundamental Physics (1)

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## WAVELET ANALYSIS FOR THE MICROSCOPE MISSION

**Abstract**

Wavelet analysis is a powerful tool for identifying and analysing non-stationary signal components. This tool will now be used as an additional technique for the analysis of the science data of the MICROSCOPE mission. This French space mission aims at a high precision test of the Equivalence Principle (EP) with a new level of accuracy. The satellite which is scheduled for launch in April of 2016 carries the T-SAGE (Twin Space Accelerometer for Gravitation Experiments) developed by ONERA to measure the differential acceleration of two test masses made of different materials (Platinum and Titanium). A violation of the EP would induce a differential acceleration signal. The achievable accuracy of the EP test depends on the resolution of the accelerometers and on the rejection of disturbing effects caused by internal and external influences like thermal radiation effects, solar radiation pressure, atmospheric drag etc. Since several years the MICROSCOPE team at the Center of Applied Space Technology and Microgravity (ZARM) develops tools for mission modelling and simulation in close cooperation with the French partners ONERA, OCA and CNES. Before the launch the main goal was to perform pre-launch test runs of the data processing with consideration of the relevant influencing effects. Now we start to contribute to the data processing and data analysis. Especially the technique of wavelet analysis will be used to identify non-stationary disturbances. Even signal components that are below the noise level of the time signal can be identified with wavelet tools. Also, disturbance signals with varying frequency can be identified with its specific fingerprints. Wavelet analysis tools allow corresponding filtering to improve the signal to noise ratio of the scientific results. The mentioned techniques and their applications to the MICROSCOPE mission are explained in this paper.