AOGS 2006

The Italian Spring Accelerometer (ISA) and the BepiColombo Mission to Mercury: 1) ISA Technical Features

VALERIO IAFOLLA[1], DAVID M. LUCCHESI[1], SERGIO NOZZOLI[1], FRANCESCO SANTOLI[1]

[1] *Istituto di Fisica dello Spazio Interplanetario (IFSI/INAF), Via Fosso del Cavaliere, 100, 00133 Roma, Italy*

The European Space Agency (ESA) cornerstone mission to Mercury denominated BepiColombo has its main goals in the recovery of Mercury's internal structure and in the accurate measurement of the post–newtonian parameters of the theory of general relativity (GR). A set of closely related experiments, namely a gravimetry experiment a rotational experiment and a GR experiment, the so–called Radio Science Experiments (RSE), will perform such very ambitious measurements. One of the instruments involved in the RSE is a high sensitivity accelerometer. The key role of the onboard accelerometer is to remove from the list of unknowns the strong non–gravitational perturbations acting on the Mercury Planetary Orbiter (MPO) spacecraft, in such a way to reconstruct, a–posteriori, the "pure" gravitational orbit of the MPO. Indeed, the accelerometer accuracy in the spacecraft orbit reconstruction will allow to remove the disturbing non–gravitational accelerations acting on the MPO surface without the necessity of their (very complex) modelling. The Italian Spring Accelerometer (ISA) developed at IFSI has been selected by ESA to fly onboard the MPO as a category 2B instrument. ISA is a three–axis torsional accelerometer with an intrinsic noise level of about 10–10g/sqrtHz (g=9.8 m/s^2) in the frequency band of 3*10^-5–10^-1 Hz. We reassume the results of our experimental and theoretical activities with ISA during recent years, with particular emphasis on the accelerometer physical characteristics and performances, on its configuration onboard the MPO spacecraft, on its thermal control and, finally, on its in–flight calibration procedures.