Contribution ID : **27** Type : **not specified**

Estimate of the magnetic contribution to acceleration noise in LISA Pathfinder

Wednesday, 16 October 2024 12:40 (20)

LISA Pathfinder was a mission designed to test key technologies required for gravitational wave detection in space. Magnetic forces have an important impact on the instrument sensitivity in the low frequency regime below the millihertz. A precise characterization of the magnetic properties of LISA Pathfinder free falling test-masses is of special interest for future gravitational wave observatory in space. We report on the magnetic injection experiments performed throughout LISA Pathfinder operations. We show how these experiments allowed a high precision estimate of the instrument magnetic parameters. The remanent magnetic moment was found to have a modulus of (0.245 ± 0.081) nAm2, the x-component of the background magnetic field within the test masses position was measured to be (414 ± 74) nT and its gradient had a value of (−7.4 ± 2.1) μT/m. The test mass magnetic susceptibility was measured to be (−3.3723 ± 0.0069)×10−5 in the low frequency regime. Finally, magnetic forces couple to the test mass motion, introducing a contribution to the relative acceleration noise between the free falling test masses. Our results set the magnetic-induced acceleration noise during the February 2017 noise run of 0.25-0.08+0.15 fm s-2Hz-1/2 at 1 mHz and 1.01-0.24+0.73 fm s-2Hz-1/2 at 0.1 mHz. We also discuss how the non-stationarities of the interplanetary magnetic field can affect these values during extreme space weather conditions. All results are in agreement with on-ground estimates.

Presenter(s) : SERRANO, Daniel Rubio (ICE-CSIC and IEEC)

Session Classification : Contributed Talks