

42nd SYMPOSIUM ON SAFETY AND QUALITY IN SPACE ACTIVITIES (D5)
From Parts to Systems : Contribution of Tests on Performance Prediction and Assessment (1)

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TESTING THE LARES SEPARATION SYSTEM

Abstract

LARES satellite is similar both in shape and weight to the LAGEOS satellites, even if the internal structure, the materials adopted, the number and position of cube corner reflectors and other details are completely different. At the beginning the similarities were calling for a separation system derived from the one of LAGEOS. This approach would have saved time in design. However time of procurement of pyrotechnic devices as well as of Marman clamp was not compatible with the LARES schedule. Also the cost associated with Marman clamp was not compatible with the LARES mission budget. As a consequence the first idea of deriving the separation system from LAGEOS design was abandoned mainly due to the tight schedule. In fact the approval by ASI of LARES experiment was on February 2008 with a foreseen launch date of November 2009. The separation system is under the responsibility of Rheinmetall which is a subcontractor of Carlo Gavazzi Space. Design and breadboarding is under the responsibility of DIAA Sapienza. In the paper we will briefly describe the overall design of the separation system and mainly we will concentrate on a critical test performed on a breadboard. Breadboard is a prototype of part of a system that should represent one or more critical issues to be investigated. In this case the critical aspect is the contact pressures between the separation system brackets and the satellite surface. Pressures applied are close to the yield limit of the tungsten alloy used for the satellite. A hemispherical cavity equal to the ones on the satellite has been manufactured on a block of tungsten alloy taken from the same batch of the flight. A pin made of the same batch of the flight material to be used for the separation system bracket has been also manufactured. A pulling machine has been used to push the pin inside the cavity at the load of 27.000 N and 40.000 N. Before and after the test the breadboard has been inspected and measured to check that it has not reached plastic deformation.