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SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems Verification and In-Flight Experimentation (6)

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LARES SYSTEM, VEGA MAIDEN FLIGHT P/L SUPPORTING THE LAUNCHER QUALIFICATION

Abstract

LARES (LAser RElativity Satellite) System is an Italian space mission, developed by Carlo Gavazzi Space - CGS for the Italian Space Agency- ASI. LARES System is the first payload of the new European Launcher VEGA and it is planned to be launched in the second half of 2011. The mission has a main scientific goal that will allow the measurement of the relativistic Lense-Thirring effect with a very high accuracy. Two additional secondary objectives are part of LARES system: a support for launcher qualification and an educational goal. Thanks to its very complex architecture together with the strictly defined LARES satellite, the scientific experiment, the system includes a sophisticated acquisition and telemetry subsystem, devoted to the characterization of the environmental conditions inside the fairing, so contributing to achieve the Launch Vehicle qualification flight objectives. Then the LARES System will release ALMASAT-1, an Italian microsatellite devoted to validation of space technology applications, and the ESA nanosatellite Cubesats, provided by different European universities and research centres, as secondary payloads. In this paper the LARES system peculiarities are described. Special attention is focused on the avionic subsystem that provides the launcher fourth stage additional telemetry. Different types of sensors are acquired for detecting pressure, heat fluxes , accelerations at low frequency, accelerations at high frequency and video. By using these measurements the environmental load acting on payload will be characterized, therefore the acoustic levels, the third stage plume impingement, random and sine vibration and shock will be detected. In particular for the shock identification an ad hoc acquisition unit has been developed able to assure the complete reconstruction of the shock event by applying a tuneable sampling up to 1 Msamples per second. The development and design of the LARES system have been performed by CGS under ASI control with ESA-IPT support, because the process itself is considered by ESA as part of the VEGA qualification.