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INITIAL ORBIT DETERMINATION RESULTS FOR THE LARES SATELLITE

Abstract

LARES (LAsER Relativity Satellite) is a laser-ranged satellite deployed by the Italian Space Agency (ASI). It is a spherical satellite covered with 92 retro-reflectors with a radius of 182 mm. Made of tungsten alloy, its weight is 387 kg, making it likely the highest mean density body in the Solar System. LARES was launched on the 13th of February 2012 and detected by radar soon after separation. Within a few days, it was acquired by laser ranging stations from all over the world. The VEGA launcher performed perfectly in its first flight by injecting the satellite in the nominal orbit with high accuracy. The measured LARES orbital elements: semimajor axis is 7827 km, orbital eccentricity is 0.0005 and orbital inclination is 69.45 degrees. The satellite is performing well, and laser returns are being collected and preprocessed by the laser ranging stations for distribution to the community by the International Laser Ranging Service (ILRS). The LARES data will be used for space geodesy, geodynamics and tests of General Relativity, in particular for the measurement of the frame-dragging effect, predicted by Einstein's gravitational theory; several years of observations are required to obtain a very accurate measurement of the effect. Ultimately, LARES has been designed for a few percent test of the frame-dragging effect, or gravitomagnetism. We

will present a preliminary analysis of the LARES orbit determination results based on the laser ranging data collected by the ILRS.