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A new general model for the evolution of the Spin vector of the two LAGEOS satellites and LARES and the LARASE research program

The LARASE (LAsEr RAnged Satellites Experiment) research program has its main objectives in tests and measurements of general relativity (GR) via a precise orbit determination (POD) of a set of geodetic satellites. In order to reach such goals by means of very precise measurements of a number of relativistic parameters (and, at the same time, with the objective to provide a robust and unassailable error budget of the main systematic effects), beside reviewing previous models we are also developing new models for the main perturbations that act on the orbits of the two LAGEOS satellites and on that of the new LARES satellite. In this talk we focus on the modeling of the spin vector of these satellites. Indeed, the spin knowledge, both in orientation and rate, is of fundamental importance in order to correctly model the thermal effects on the surface of these satellites, as in the case of the solar Yarkovsky-Schach effect and of the Earth's Thermal drag (also known as Earth-Yarkovsky effect or Rubincam effect). These are very important non-gravitational perturbations (NGP) that produce long-term effects on the orbit of the cited satellites. Therefore, the improvement of the accuracy of the models developed to handle these NGP represents a very significant result. Such improvements, with the possibility of a more reliable POD for the satellites, will be very useful in the field of GR measurements with laser-ranged satellites, as well as in the field of space geodesy and, in general, in those of geophysics.