Lunar Laser Ranging - A Science Tool for Geodesy and General Relativity

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Abstract

Lunar Laser Ranging (LLR) has routinely provided observations for more than 38 years. A new site called APOLLO has just started with measurements reaching mm ranging accuracy. The main benefit of LLR is, e.g., to determine many parameters of the Earth-Moon dynamics (e.g. orbit and rotation of the Moon, a selenocentric reference frame or the secular increase of the Earth-Moon distance: 3.8 cm/year) and to test metric theories of gravity. LLR data analysis determines gravitational physics quantities such as the equivalence principle, any time variation of the gravitational constant, relativistic precessions, and several metric parameters. The gravitational physics parameters cause different spectral perturbations of the lunar orbit, which can be used to separate the various relativistic and Newtonian effects with high accuracy. We give an overview of the recent status of our LLR analysis procedure, present new results for the relativity parameters, and address potential capabilities of LLR in the near future.

Details of our LLR analysis procedure and new results for gravitational physics and Earth orientation parameters are given in the paper of L. Biskupek and J. Müller about "Relativity and Earth Orientation Parameters from Lunar Laser Ranging" in these proceedings, Session "Lunar and Interplanetary Laser Ranging**"**.