A.S. Akentyev, A.L. Sokolov, M.A. Sadovnikov, V.D. Shargorodskiy

Preliminary results of the laser ranging space experiment of spacecraft «Lomonosov»

The report narrates about the preliminary results of laser ranging spacecraft (SC) «Lomonosov». The SC with scientific equipment of Moscow State University was launched at the sun-synchronic orbit 500 km height in April 2016 for studies phenomena in the Earth's upper atmosphere layers. The SC board equipped by two small new type retroreflector arrays (RA) «Pyramid» created by the JSC «RPC «PSI». Each of them has a pyramid construction composed of four corner reflectors with a common arrangement of the vertex and capable to reflect the laser pulses from the entirely lower hemisphere. The RA mass is 60 g and withal the «target error» does not exceed 0,5 mm. The first RA located at the hull of SC, and the second at the pullout rod with the distance approximately 2 m from first RA. The measurement results with the single-photon counting mode of photodetector shows two tracks at the distance depended from the SC orientation relatively of laser station at the observation time. The RA provides the sufficient level of the reflected signal despite the small RA size (not bigger than 4 cm). According to the first estimate the cross section of the «Pyramid» is the 0,02 – 0,05 million sq. m relatively the measurement results of SCs Lageos and Stella. The results of the space experiment allow to recommend the RA to be installed at LEO SC for the determination their orientation and additional monitoring of deployment of the component parts SC in the space.