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MEASUREMENT OF THE PARAMETERS OF THE GRAVITATIONAL FIELD OF DEEP SPACE.

Abstract

All modern gravitational space missions, such as GOCE or GRACE, can not provide autonomous measurements of the parameters of the gravitational field of deep space, since the instrumentation used on board is a kind of accelerometer that can not function without external measurements (navigation and ballistic). This task can be solved by the relativistic gravimeter developed by the author, which uses the effect of gravitational displacement of the frequency of electromagnetic radiation. The principle of the relativistic gravimeter is that on board the spacecraft is a highly stable frequency standard and at least three receivers of electromagnetic radiation, which are orthogonally spaced relative to the frequency standard. The frequency standard and the receivers are interconnected. By measuring the gravitational frequency shift between the frequency standard and the receivers, we determine all three components of the acceleration of gravity. The technical prerequisite for the development of such a spacecraft is the creation of optical femtosecond frequency standards, the dimensions of which do not exceed the match head. In addition to the absolute value and gradient of the acceleration of free fall, such a spacecraft could also measure the mass of cosmic objects. The relativistic gravimeter, the method of measuring the parameters of the gravitational field and the mass of space objects are patented. Also, the original design of the spacecraft is patented. At present, the first sample of a relativistic gravimeter was created in 2017 and is in trial operation.