SIMULATING THE SIGNAL OF A TORSION BALANCE GRAVIMETER

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Abstract

Studying the structure of a torsion balance gravimeter helped us to construct a model of its oscillator system that makes it possible to predict the behaviour of an informative parameter, the deflection angle of its barbell-shaped rod, deviating from the equilibrium state when the instrument moves in a non-homogeneous gravity field specified by means of a tensor of second-order gravitational potential derivatives (the Eötvös tensor). We derived expressions for computing the Eötvös tensor for a gravity field generated by a preset distribution of point masses. We implemented a simulation that makes it possible to compute the signal emitted by a torsion balance gravimeter moving in a non-homogeneous gravity field, taking into account a number of structural parameters and errors, such as the quality factor of the oscillator system, a discrepancy in the resonant frequencies of the barbells, etc.

Keywords

Anomalous gravity field, tensor of second-order derivatives, Eötvös tensor, gravity gradiometer, gravimeter, gravitational potential

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