Calculation of parameters of the seismic waves which are formed at high-speed impact by an asteroid Apophis on the Moon surface

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Use of an asteroid Apophis for realization of a large-scale space experiment was offered earlier [1]. Experiment consists in the organization of shock interaction of an asteroid and the Moon. Initiation of large-scale collision will allow to answer a number of the physical questions concerning the Moon. In the present work the 2D-method of calculation of seismic waves propagating in multilayered structure of the Moon is offered. This method is synthesis of a finite–difference method and analytical method of expansion in a series. The problem is considered in the spherical system of coordinates. The solution is expanded in series on the angular coordinate (the latitude of the locality). The system of the differential equations for the series coefficients depending on radial coordinate and time decides by finite–difference method. The structure of the Moon is specified according to speed model by Latem and Toksotsu [2]. Calculated parameters of seismic waves are used for definition of number and the locations of seismic stations. Requirements to the accuracy of measurements of seismic characteristics are formulated.
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[1] Ostrik A and Fortov V 2010 *XXV International Conference 'Equations of states for Matter'* 150–151

[2] Galkin I N and Shvarev V V 1977 *Structure of the Moon* (Moscow: Knowledge)