Model of soil cloud dynamics at impact of the asteroid Apophis to the lunar surface

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The problem aiming qualitative change of an Apophis orbit when its movements in Solar system comes to the end is formulated in [1]. Instead of passive saving tactics the variant of use of this asteroid is considered for realization of large-scale space experiment. This experiment is shock interaction of this asteroid and the Moon. Calculation of development of the soil cloud which is formed as a result of impact in the field of the Moon gravity is difficult on the basis of gas-dynamic model till times which are of practical interest. So the data obtained in a near impact zone by numerical methods of gas dynamics are used as initial data for the offered approximate model, in which the cloud is represented consisting of two independent subsystems: gas and condensed medium. Scattering is considered as axisymmetric. Particles of the medium are presented in the form of non-interacting ringlets of the known initial density and mass. The mass center of ringlet section is considered moving like a material point in the field of acceleration of the Moon gravity. Expansion of a ringlet along the radius of cross section is considered analytically. Results of calculations of parameters of a soil cloud at perpendicular impact of Apophis to the Moon surface are given for speed 5 km/s. It is obtained that the external contour of a cloud rises up to the heights of 500 km at time 550 s, and soil cloud density changes with height from 1 g/cm³ to practical zero.