MODELING OF THE MOVEMENT OF METEOROID FRAGMENTS. AN ESTIMATIONOF SEPARATION DISTANCE. N.G. Barri, Institute of Mechanics, Lomonosov Moscow State University, Michurinsky pr-t, 1, Moscow, 119192, Russia. E-mail: n_barri@imec.msu.ru

Introduction: A meteoric body has great loading during its passage through the atmosphere with a velocity from 11 to 72 km/s. A meteoroid collapses when aerodynamic pressure on a front surface reaches the critical value equals to durability of a body material. Its fragments separate in a transverse direction as a result of interaction of shock waves. Besides, smaller fragments decelerate more than large ones. Thus, there is a separation in a longitudinal direction also. A modelling of two fragments movement in the atmosphere is carried out in this work. Two cases are considered: scattering of two identical fragments in a transverse direction and scattering of two fragments of different radii simultaneously in a longitudinal and transverse direction.

Separation of two identical fragments: A quite simple analytical expression of transverse velocity of fragment U_f through parameters of the body material (strength σ_t and density ρ_m) and repulsive force coefficient for two identical fragments is obtained: $U_f = \sqrt{3\sigma_t \left(0.5 C_0 + 2 d_0\right)/8 \cdot \rho_m}$.

Values C_0 and d_0 define an approximation of the repulsive force coefficient. This coefficient is used as an approximation result of the numerical simulation of the flow past two identical spheres [1] and two spheres of different radii [2], [3].

Separation of two fragments of different mass: In the case of fragments of different mass a smaller fragment decelerate more in comparison with large one and a smaller fragment more separates from the trajectory of a main body in transverse direction. The last statement relies on results of the work [2] in which the repulsive force coefficient is calculated for two spheres of different radii in a supersonic flow. A following model is proposed in the present work. A smaller fragment moves in transverse direction at right angle to a plane formed by the trajectory of a main body and its projection on the horizontal. A large fragment does not deviate from the trajectory of a parent body. That is, separation of fragments takes place due to strong deceleration of smaller fragment and its deviation in orthogonal direction. In the case of different fragments a transverse velocity depends on a quotient of fragments radii $U_f = \sqrt{(R_1/R_2) \cdot 3\sigma_t \left(C_0 + 2 d_0\right)/8 \cdot \rho_m}$, where R_1 is a radius of a large fragment, R_2 is a radius of a smaller fragment.

A numerical solution of combined equations of deceleration and ablation is used for description of a longitudinal movement of a parent body and fragments. Calculations according to proposed models and an estimation of separation distance of fragments are carried out in the work. There is discovered that fragments separate sufficiently fast to a distance of independent movement.

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References: [1] Zhdan I.A., Stulov V.P. and Stulov P.V. (2004) *Doklady Physics, 49(5),* 315-317. [2] Zhdan I.A. (2005) *Lomonosov Conference,* Abstract #88. [3] Barri N.G. (2008) *Earth, Moon and Planets.*