

## SIMULATION OF INSTANTANEOUS METEOROID FRAGMENTATION AND ASSOCIATED ENERGY RELEASE

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**Introduction:** The report continues the authors' research on the destruction of meteoroids in the atmosphere. In this paper, we propose a model for the fragmentation of a fireball and a model for the transition of its kinetic energy to thermal energy, assuming the destruction of the body to many fragments.

The nature of the crushing of meteoric bodies in the atmosphere is determined by a number of factors. Some of them are the magnitude of the load, the structure of the body, its internal properties (composition, density, strength with respect to various loads) [1]. An important result of such studies is the generation of the distribution of the produced particles by mass. Many problems are devoted to these problems, both theoretical and experimental [2-4].

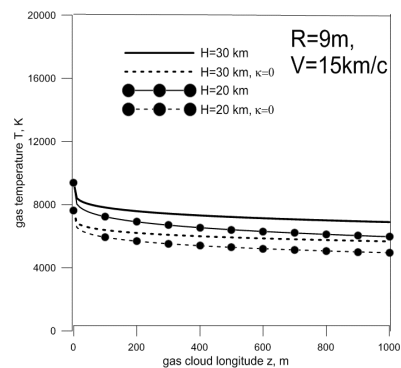


Figure 1. The temperature of gas cloud assuming characteristic mass spectrum [6] taking into account ablation and without ablation  $\kappa=0$ .

**Calculation of the Temperature of a Gas Cloud:** According to the procedure described in the [5] we calculated heat transfer to a gas cloud by particles of meteoroid particles with the distribution by mass, similar to the destruction of a solid body during an explosion [2]. Also a model of fracture into identical fragments was calculated. A comparison was made of the energy released when the meteoroid was destroyed and heated the air region for different models of fragmentation with and without allowance for particle ablation. The comparison showed that when the body is destroyed to the similar particles, an energy is overestimated and of an order of magnitude in comparison than when destroyed by particles having a characteristic mass spectrum. Taking into account particles ablation also increases the energy release. So the instantanios fragmentation into a small similar particles sould not be under consideration.

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**References:** [1] Popova O. P. 2004. *Earth, Moon, and Planets*, 95:303-319. [2] Fujiwara A. 1986 *Mem. della Soc. Astr. Italiana*, 57:47-64. [3] Pilyugin N.N. 2008 *Combustion, Explosion, and Shock Waves*. 44:239-247. [4] Okamoto C., Arakawa M. 2009 *Meteoritics & Planetary Science*. 44:1947-1954. [5] Egorova L. A., Lokhin V. V. 2018 *Open Astronomy* (submitted) [6] Nemchinov, I.V., Popova, O.P., Terev, A.V. 1999 *J. of Eng. Phys. and Thermoph.* 72, 1194-1223.