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THE HELIOCENTRIC DISTRIBUTION OF THE METEOR BODIES AT THE VICINITY OF THE EARTH'S ORBIT

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A determination of velocity distributions of sporadic meteor bodies and distributions of their radiants over the celestial sphere corrected for the motion and attraction of the earth is one of the main problem of the meteor astronomy. An analytical model of these distributions has certain interest.

There are now three traditional ground-based methods of meteor observations: visual, photographic and radar ones. All these methods yield strongly different apparent velocity and radiant distributions. The differences on the one hand may be interpreted as due to their own distinctive features for different observed mass ranges. On the other hand the differences may be caused by the methods of observations.

All methods of observations deal with different sides of the meteor phenomenon. The intensity of light by visual observations, the linear electron density by radar, the intensity of a meteor track at the plate in photographic observations are registered. Thus one has to obtain the distributions for particles over certain mass ranges in order to compare results of observations.

We have assumed the following form of the relation of the ionisation coefficient ß with the velocity:

$$ß = ß_o\ (v - v_o)^{3.5}.$$

Similar relations exist for the luminous efficiency for visual and photographic meteors:

$$\tau = \tau_o'\ (v - v_o)^{0.35}, \qquad (v \leq 16 \text{ km/sec}),$$

$$\tau = \tau_o''\ (v + v_o)^{-1}, \qquad (v \geq 16 \text{ km/sec}).$$

v_o = the threshold velocity, below this velocity ionisation and luminosity are practically negligible.

v_o = 8,8 km/sec, $ß_o = 8{,}4 \times 10^{-7}$; $\tau_o' = 1{,}15 \times 10^{-13}$ and $\tau_o'' = 5{,}7 \times 10^{-12}$.

The geocentric velocity and flux density distributions over the celestial sphere for photographic and radar meteors were derived taking into account the above mentioned modified relations. No significant differences in the distributions were found in the results.

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The heliocentric distributions of velocities and radiants were derived from geocentric ones. The formula of astronomical selection has been used in the derivation which is different from Öpik's one. The radiant density in the antapex direction exceeds the density in the apex direction by approximately 10^3 times.

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