

Grazing atmosphere meteors: observation results, physical modeling of the flight, and probability to detect

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Results of TV-detection, kinematic and photometric processing (Kozak & Watanabe 2017), physical modeling of the flight, and probability to observe of the atmosphere grazing low-light meteor are presented. The meteor identified as sporadic one was registered near Kyiv, Ukraine, on 23 September 2003. It was detected at altitude range 115.6-117.9 km, had zenith distance of radiant 93.7-94.0 degrees, and was relatively faint as 4.1-2.9 absolute astronomical magnitude. The perigee distance was 6467.4 km, the minimal altitude above sea level 101.7 km, velocity at infinity 62.9 km/s. The meteor was observed at the distance of 426 km after its perigee, and remained inside fields of view of cameras during near 0.5 s passing the distance 35 km during this time. The physical model of liquid drop was used for the meteor flight description. Since the grazing meteor moved in low-density atmosphere layers the system of heating and ablation equations was enhanced with the equation of fusion, which plays significant role in this case. It was demonstrated that in spite of low mass of the meteoroid it could leave the earth atmosphere with mass remnant. The probability of such meteors observations is calculated.

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References

Kozak P.M., Watanabe J. Upward-moving low-light meteor – I. Observation results (2017) MNRAS, 467, 1, 793-801.