

Non-equilibrium meteor entry: in search of the coefficients of interest to improve meteor modelling

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Meteor entry is characterized by complex shock layer physics such as radiation, evaporation of the meteoroid surface and the resulting chemistry process with the Air constituents. Several non-equilibrium effects arise from coupling all the phenomena, i.e., electron precursor in the free-stream, high level of ionization on the shock layer and thermal non-equilibrium effects on the boundary layer. All these effects must have to be taken into account when deriving quantities of interest such as heat transfer coefficient and luminosity coefficients in order to interpret the luminosity curves.

In this work, we present the analysis of a meteor entry using Computational Fluid Dynamic tools where we implemented a boundary condition for evaporation.

Moreover, we used an efficient and low CPU cost method to compute and radiative source terms and couple to them to the Navier-Stokes equations. We will present a parametric study for meteor sizes and altitudes where heat transfer and luminosity coefficients will be derived.