Abstract Submitted
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Self-consistent collisional-radiative model for shock tube in Jupiter atmosphere[1] GIANPIERO COLONNA, DANIELA LUCIA PIETANZA, GIULIANO D'AMMANDO, CNR-IMIP Bari, CNR-IMIP BARI TEAM — Modeling vehicle entering in planetary atmospheres is a complex problem involving thermal and chemical non-equilibrium interacting with the radiation field. In this contribution we present a kinetic model that couples self-consistently the free electron Boltzmann equation, state-to-state chemical kinetics and radiation transport equation for shock wave in Jupiter atmosphere. The rapid growth of the translational temperature, induce the increase of the energy of internal degrees, followed by dissociation and ionization. The radiation causes non-local effects, because the radiation emitted inside the shock wave, can be absorbed in different location. The fluid dynamic equations considered here are those of the one-dimensional stationary shock tube. Collisional-radiative model of hydrogen and helium atoms has been considered, including atom-atom collisions. Non-equilibrium distributions arise, showing steps and plateaux, inducing anomalous behaviors as non-monotone trend of the internal temperature of atomic species and strong interaction between the radiation field and the ionization degree.

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