Abstract Submitted
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Electron swarm from very low to intermediate E/N in homonuclear diatomic molecules H_2, O_2 and N_2[1] M.A. RIDENTI, Departamento de Física, Instituto Tecnológico de Aeronáutica, L.L. ALVES, V. GUERRA, Instituto de Plasmas e Fusão Nuclear, Instituto Superior Técnico, Universidade de Lisboa, J. AMORIM, Departamento de Física, Instituto Tecnológico de Aeronáutica — In this work the homogeneous Boltzmann equation is solved in order to describe the electron swarm in N_2, O_2 and H_2 within the interval $10^{-4} - 10$ Td. Elastic, rotational and vibrational collisions are taken into account and it is shown how each of these channels contributes to the electron energy balance as a function of E/N. Three different approaches are adopted to account for the rotational collisions. The first one, which gives the most accurate results, consists of computing the discrete inelastic / superelastic collisional operator, written for a number of rotational levels that depends on the molecular gas and the specific rotational cross sections considered. The second approach is the continuous approximation for rotations, as proposed by the classical work of Frost and and Phelps (Phys. Rev. 1962). The last approach is a modified version of the continuous approximation for rotations, including a Chapman-Cowling corrective term proportional to the gas temperature, which is deduced here. Results from this last approach show that it may be used to bridge the gap between the discrete and the continuous descriptions at low/intermediate E/N. The calculations are compared with measurements for the available swarm parameters.

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M.A. Ridenti
Instituto Tecnológico de Aeronáutica

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