

Abstract Submitted
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Third order transport coefficients for electrons and positrons in gases SASA DUJKO, ILIJA SIMONOVIC, Institute of Physics, University of Belgrade, Serbia, RONALD WHITE, College of Science, Technology Engineering, James Cook University, Australia, ZORAN PETROVIC, Institute of Physics, University of Belgrade, Serbia — Third order transport coefficients (the skewness tensor) of the electron and positron swarms, in atomic and molecular gases, are investigated. The knowledge of the skewness tensor is necessary for the conversion of the hydrodynamic transport coefficients to the arrival time and steady-state Townsend transport data as well as for the determination of the deviations of the spatial density profiles from an ideal Gaussian. In this work, we investigate the structure and symmetries along individual elements of the skewness tensor by the group projector method. Individual components of the skewness tensor are calculated using a Monte Carlo simulation technique and multi term theory for solving the Boltzmann equation. Results obtained by these two methods are in excellent agreement. We extend previous studies by considering the sensitivity of the skewness components to explicit and implicit effects of non-conservative collisions, post-ionization energy partitioning, and inelastic collisions. The errors of the two term approximation for solving the Boltzmann equation are highlighted. We also investigate the influence of a magnetic field on the skewness tensor in varying configurations of electric and magnetic fields. Among many interesting points, we have observed a strong correlation between the skewness and diffusion.

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