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Monte Carlo simulations of electron transport in strongly attaching gases ZORAN PETROVIC, JASMINA MIRIC, ILIJA SIMONOVIC, DANKO BOSNJAKOVIC, SASA DUJKO, Institute of Physics, University of Belgrade, Serbia — Extensive loss of electrons in strongly attaching gases imposes significant difficulties in Monte Carlo simulations at low electric field strengths. In order to compensate for such losses, some kind of rescaling procedures must be used. In this work, we discuss two rescaling procedures for Monte Carlo simulations of electron transport in strongly attaching gases: (1) discrete rescaling, and (2) continuous rescaling. The discrete rescaling procedure is based on duplication of electrons randomly chosen from the remaining swarm at certain discrete time steps. The continuous rescaling procedure employs a dynamically defined fictitious ionization process with the constant collision frequency chosen to be equal to the attachment collision frequency. These procedures should not in any way modify the distribution function. Monte Carlo calculations of transport coefficients for electrons in SF_6 and CF_3I are performed in a wide range of electric field strengths. However, special emphasis is placed upon the analysis of transport phenomena in the limit of lower electric fields where the transport properties are strongly affected by electron attachment. Two important phenomena arise: (1) the reduction of the mean energy with increasing E/N for electrons in SF6, and (2) the occurrence of negative differential conductivity in the bulk drift velocity of electrons in both SF_6 and CF_3I.

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