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Dependence of ion drift velocity and diffusion coefficient in parent gas on its temperature.[1] SERGEY MAIOROV, Joint Institute for High Temperatures of RAS, Moscow, RUSUDAN GOLYATINA, A.M. Prokhorov General Physics Institute of RAS, Moscow — The results of Monte Carlo calculations of the ion drift characteristics are presented: ions of noble gases and Ti, Fe, Co, Cs, Rb, W and mercury ions in case of constant and uniform electric field are considered. The dependences of the ion mobility on the field strength and gas temperature are analyzed. The parameters of the drift velocity approximation by the Frost formula for gas temperatures of 4.2, 77, 300, 1000, and 2000 K are presented. A universal drift velocity approximation depending on the reduced electric field strength and gas temperature is obtained. In the case of strong electric fields or low gas temperatures, the deviation of the ion distribution function from the Maxwellian one (including the shifted Maxwellian one) can be very significant. The average energies of chaotic motion of ions along and across the electric field can also differ significantly. It is analyzed the kinetic characteristics of ion drift in own gas: ion diffusion coefficient along the field and across the field; thermal spread of velocities (temperature) along the field and across the field. The unexpected and nontrivial fact takes place: collision with backscattering represent only 10-50% of the total number of collisions. This calculation can be used when analyzing experiments with dusty plasma under cryogenic discharge, ultracold plasma.

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