The drift of electrons in a gas in a spatially inhomogeneous periodic electric field

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Diffusion and drift of electrons in gases studied in detail in many papers, but the complexity and diversity of the various applications of gas discharge leads to the need to develop efficient methods for their analysis [1]. Monte Carlo method is a powerful tool for solving various problems in plasma physics and in the present review summarizes some of the results are physically different, but united by a common methodology tasks:

***Drift of electrons in a homogeneous stationary field.*** Considered a model of electron-atom collisions , which allows properly take into account the energy balance of electrons , including in inelastic collisions . For all the noble gases are tabulated characteristics of the distribution function of the electron velocity , the energy characteristics of the electron drift in a constant electric field. In most of the manuals and books are just the electron drift velocity observed in experiments and characteristic energy Townsend and therefore also calculated the average energy of the electrons , the average electron energy , leading to acts of excitation and ionization of atoms , the ratio between the energy loss in elastic and inelastic collisions , ionization Townsend coefficient , etc.

***Drift of electrons in the spatially homogeneous nonstationary field***. This problem is basic when considering the various technological processes in microelectronics and the developed technique allows to obtain interesting results in a rather simple statement , for example , to determine the floating surface potential.

***Drift of electrons in a spatially inhomogeneous periodic field***, which is a periodic perturbation of exponential character: A comparison of the distribution functions of the electron energy distributions with Maxwell Druyvesteyn and approaching an unlimited flow. From the analysis of the results of calculations that even large spatial fluctuations of the field does not lead to a large change in the average characteristics of the drift of the drift velocity and average energy, but the greatest influence increase in the dispersion of the field has on the rate of ionization , has been a considerable increase of the ionization rate and the proportion of energy used for ionization and - field spatial heterogeneity can lead to Maxwellian electrons in the glow Townsend discharge that is the subject of a long-known and widely discussed Langmuir paradox .

***Drift of electrons with strong spatial heterogeneity***. The case of the barrier discharge for the cases of different geometry - planar, cylindrical and spherical .

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References

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