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Drift velocity of the electron transport in RF electromagnetic field in N_2 gas

Tuesday, 30 August 2022 18:00 (1h 30m)

The research topic is calculation of the drift velocity of electron transport in N_2 gas under the influence of an external crossed electromagnetic field, $E \times B$. A Monte Carlo simulation code has been used to obtain non-equilibrium electron energy distribution function within one oscillation of external crossed fields. In simulation, E is aligned with the z -axis, while B is parallel with y -axis.

In order to test our simulation code validity under the condition of crossed RF electric and RF magnetic fields, we compared drift velocity components of electron transport in Reid's model gas with the available literature data. The results show the transversal drift velocity (V_x , in $E \times B$ direction) obtained by our simulation and obtained by Petrovic et al., with their Monte Carlo code. The calculation was performed for the frequency of 50 MHz, reduced electric field of 14 Td while the reduced magnetic field value was 500 Hx. One can clearly see the excellent matching of the compared velocities which proves the validity of our code.

According to the results of that comparison, we have been encouraged to research and calculate the drift velocity components of electron transport in real N_2 gas. These results have been obtained under the condition of reduced electric field, E/N , of 100 Td, frequency of 100 MHz and reduced magnetic field, B/N , of 1000 Hx.

References

1. Z. Lj. Petrović, Z.M. Raspopović, S. Dujko, T. Makabe, Applied Surface Science, 192 (2002) 1-25

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