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1P15 - Determination of First Townsend Ionization Coefficient by Simulation

Monday 24 June 2019 13:00 (1h 30m)

In 1963, L.M. Chanin and G.D. Rork[1] measured the first Townsend ionization coefficient for various gasses and a range of pressures experimentally in a vacuum tube. A Townsend discharge is an ionization avalanche that occurs between two electrodes when secondary electron emission caused by ion impact on the cathode is negligible. The first Townsend coefficient, α, is essentially a measure of how many ionization events a single electron will cause when subject to a uniform electric field. In this study, we reproduce the experimental setup of Chanin and Rork's device in VSim[2], a highly parallelized particle-in-cell/finite-difference time-domain code. Various particle interactions are included, and the first Townsend coefficient is calculated and compared to the reported value. This Work supported by U.S. Department of Energy, SBIR Phase II award DE-SC0015762.

[1] L.M. Chanin and G.D. Rork, Phys. Rev. 133, A1005 (1964)
[2] C. Nieter and J. R. Cary, "VORPAL: a versatile plasma simulation code", J. Comp. Phys. 196, 2004, pp. 448-473.

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