

Electro-Hydrodynamic Analysis of Low-Pressure DC Glow Discharge by Lattice Boltzmann Method

Authors : Ji-Hyok Kim, Il-Gyong Paek, Yong-Jun Kim

Abstract : We propose a numerical model based on drift-diffusion theory and lattice Boltzmann method (LBM) to analyze the electro-hydrodynamic behavior in low-pressure direct current (DC) glow discharge plasmas. We apply the drift-diffusion theory for 4-species and employ the standard lattice Boltzmann model (SLBM) for the electron, the finite difference-lattice Boltzmann model (FD-LBM) for heavy particles, and the finite difference model (FDM) for the electric potential, respectively. Our results are compared with those of other methods, and emphasize the necessity of a two-dimensional analysis for glow discharge.

Keywords : glow discharge, lattice Boltzmann method, numerical analysis, plasma simulation, electro-hydrodynamic

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