Abstract Submitted
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Two-dimensional extended fluid model for a dc glow discharge with nonlocal ionization source term[1] ISMAIL RAFATOV, Middle East Technical University, Ankara, Turkey, EUGENY BOGDANOV, ANATOLIY KUDRYAVTSEV, Saint Petersburg State University, St. Petersburg, Russia — Numerical techniques applied to the gas discharge plasma modelling are generally grouped into fluid and kinetic (particle) methods, and their combinations which lead to the hybrid models. Hybrid models usually employ Monte Carlo method to simulate fast electron dynamics, while slow plasma species are described as fluids. However, since fast electrons contribution to these models is limited to deriving the ionization rate distribution, their effect can be expressed by the analytical approximation of the ionization source function, and then integrating it into the fluid model. In the context of this approach, we incorporated effect of fast electrons into the "extended fluid model" of glow discharge, using two spatial dimensions. Slow electrons, ions and excited neutral species are described by the fluid plasma equations. Slow electron transport (diffusion and mobility) coefficients as well as electron induced reaction rates are determined from the solutions of the electron Boltzmann equation. The self-consistent electric field is calculated using the Poisson equation. We carried out test calculations for the discharge in argon gas. Comparison with the experimental data as well as with the hybrid model results exhibits good applicability of the proposed model.

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Ismail Rafatov
Middle East Technical University, Ankara, Turkey

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