

A MATHEMATICAL MODEL OF PLANE GLOW DISCHARGE AND HOLLOW CATHODE EFFECT

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S u m m a r y

A non-local mathematical model for glow discharge processes, which are significant for main structures of glow discharge (cathode dark space, negative glow, and positive glow), is proposed. The model includes a possibility of the electron pendulum effect in the hollow cathode plane geometry. An integral equation for a source of ionization is derived, and its solution is calculated. A self-sustained discharge condition is formulated. A self-consistent system of differential equations and boundary conditions for the electric field and the electron and ion current densities is deduced and solved. The current voltage characteristic illustrating the hollow cathode properties is obtained. The origin of the difference between a hollow cathode discharge (HCD) and a simple glow discharge (SGD) is investigated.