2-D nonlocal model of the positive column of the weak-current DC discharge in neon

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Two-dimensional (under the assumption axial symmetry) model of the positive column of the discharge of direct current in neon with the nonlocal function of the distribution of electrons is proposed. In this model it is assumed that the function of the distribution of electrons, considered as the function of coordinates and electronic energy, weakly changes on a radius of the tube (length of energy relaxation it is great in comparison with a radius of tube). The processes of the excitation of the electron levels from the ground state, ionization from the basic and metastable states, chemiionization with interaction of two atoms in the metastable states, diffusion of metastables to the wall, recombination of electrons on the wall (approximation "black wall") are considered. The motion of ions is described in the hydrodynamic approximation with the variable mobility. Longitudinal and radial fields are calculated selfconsistently from conditions of the fixed longitudinal current and stationarity of discharge. Range of the applicability of model is PD from 10 to 100 Pa cm with the concentration of the electrons $<10^{10}$ cm^{-3}. The results of test calculation are given.