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Kinetic simulation of subnanosecond current front rise in high-voltage pulse open discharge IRINA SCHWEIGERT, Institute of Theoretical and Applied Mechanics, SB RAS, A.L. ALEXANDROV, ITAM SB RAS, P. A. BOKHAN, DM. E. ZAKREVSKY, A.V. Rzhanov Institute of Semiconductor Physics, SB RAS — Generation of high-power electrical pulses with nanosecond front rise times is widely used in various applications. In this work in kinetic simulation we study the switching performance of moderate-pressure open discharge in helium for the experimental conditions [1]. The discharge ignition (with current front rises) takes place during time t $<$ 1 ns after applying few kilovolts voltage. This phenomenon of high-efficiency generation of electron beams was studied previously and based on the effect of runaway of electrons. The discharge has a plane geometry and glows in a narrow gap (of width less than 1 cm) between two cathodes and a grid anode between them. The mechanism providing the high-efficiently electron generation is related to the fast excitation of atoms and transport of the photons to the cathodes without reabsorption. In calculations, the motion of electrons, ions and fast neutrals is simulated, solving the kinetic equations and Poisson equation with PIC MCC method self-consistently. The ionization and excitation of atoms takes place after collisions of neutrals with electrons, ions and fast neutrals.

[1] P.A. Bokhan, P.P. Gugin, M.A. Lavrukhin, and Dm.E. Zakrevsky, Phys. Plasma, **20**, 033507, (2013).

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