Modeling barrier microdischarge at different signals of supply voltage

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In this work modeling of atmospheric pressure barrier discharge in argon for various types of voltage signals applied to the electrodes was conducted. The model included balance equations for the densities of charged (electrons, ions) and the excited particles, the electron energy density, and the Poisson equation for the electric potential. The fluxes of charged (electrons, ions) and electron energy flux were given in the drift-diffusion form. We considered two types of signals applied to the electrode with various frequency: sine wave signal and square wave signal with duty ratio variable. In the simulation result was obtained spatial-temporal distribution pattern parameters of dielectric barrier micro-discharge at atmospheric pressure. It has been shown that there is a current pulse at half period the voltage supplied to the discharge for the conditions of the discharge and the account number of plasma chemical reactions occurring in the discharge. Graphs the distribution of the main dielectric barrier micro-discharge parameters are presented in moments of current pulses with different polarities. The described model of allows us to describe the main parameters of dielectric barrier micro-discharge plasma at atmospheric pressure and it is a useful tool in predicting their basic properties under various external conditions. This work was supported by the Russian Federation Presidential Grant (project no. MK-539.2017.1) and the Russian Foundation for Basic Research (project No. 16-38-60187).