

Abstract Submitted
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Oscillations of current in dc discharge induced by an auxiliary electrode IRINA SCHWEIGERT, Institute of Theoretical and Applied Mechanics, Institytskaya 4/1, Novosibirsk, 630090 Russia, VLADIMIR DEMIDOV, West Virginia University, Morgantown, WV 26506, USA, IGOR KAGANOVICH, Princeton Plasma Physics Laboratory, Princeton, NJ 08543, USA — The plasma parameters of dc discharge with thermionic emission cathode can be actively controlled by addition of the second anode made as a diaphragm with a hole in the center (see for example, [1]). This control is based on fundamental property of nonlocal electron kinetics and can be beneficial for variety of applications. We simulated parameters of this dc discharge plasma making use of two-dimensional PIC MCC code. The geometry of device and plasma parameters are taken from Ref. [1]. The dc discharge operates in helium at gas pressure 0.5 - 4 Torr and is supported by the thermionic emission of electrons from cathode. The inter-electrode distance is 1.1 cm and the diaphragm is placed at distance 0.1 - 0.15 cm from anode. The discharge current ranges from 0.05A to 0.3A. The plasma characteristics, potential, electron and ion density profiles and EEDF are studied for different current densities, gas pressures and radius of diaphragm hole. The presence of the diaphragm leads to increased ionization only for a certain range of gas pressures and the radii of diaphragm hole. An increase of a size of diaphragm hole leads to development of current oscillations.
[1] V. I. Demidov, C. A. DeJoseph, Jr., V. Ya. Simonov, Appl. Phys. Lett. 91 (2007) 201503.

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