INVESTIGATION OF THE MATERIAL EVAPORATION EFFECT OF REFRACTORY AND NON-REFRACTORY ELECTRODES ON THE PARAMETERS OF A LOW-CURRENT ARC DISCHARGE [[1]](#footnote-1)\*)

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Self-consistent models of DC gas discharges have been developed in this work, which describe the processes occurring in the gas-discharge gap and in the electrodes [1-4]. In the presented work, the influence of electrode material evaporation on the distributions of the main plasma parameters in arc discharges of atmospheric pressure in argon with graphite (refractory) electrodes and copper (non-refractory) electrodes is taken into account, the current maintenance in which is provided by thermionic emission and thermionic field emission, respectively.

In addition to plasma-chemical processes in argon [1], for a discharge with graphite electrodes, a fairly detailed set of plasma-chemical reactions was compiled, taking into account the formation of neutral carbon particles C, С2, С3, their ions C+, С2+, С3+ and excited states C\*, С2\*, С3\* . For a discharge with copper electrodes, a set of elementary processes with the participation of copper atoms was taken into account, taken from [3], in which processes with the formation of atomic copper ions were taken into account.

As a result of numerical experiments in a wide range of input power within the framework of one-dimensional geometry, the effect of evaporation of the electrode material on the characteristics of the arc discharge was studied. It is shown that when the critical value of the current density is reached, an abrupt change in the plasma parameters is observed: on the current-voltage characteristic of the discharge and on the concentrations of charged particles averaged over the gas-discharge gap. A transition is observed from an arc discharge in an argon atmosphere to an arc in carbon vapor or copper vapor.

References

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