2D Plasma Density Distributions and Plasma Vortex Motion in Low-Pressure Gas Discharges SERGEY DVININ, Lomonosov Moscow State university, Faculty of Physics — Plasma density distribution in a 2D nonuniform positive column of a low-pressure gas discharge is studied in the hydrodynamic approximation with allowance for ion inertia. Hodograph transformation [1] taking into account plasma vortex motion was used to solve system of equation. The vortex motion can be caused by drift of ions, neutral gas flow through the discharge chamber and a complex chemical nature of plasma. Influence of the listed effects on spatial distribution of charged particles density and electric field, necessary for discharge maintenance, is considered. The solution is presented in the form of a number on the predetermined system of functions. Asymptotic solutions near the coordinate origin and near the critical surface are considered. It is shown that, for potential plasma flows, the flow velocity component normal to the plasma boundary is equal to the ion acoustic velocity. The results obtained can be used to analyze the processes in low-pressure plasmochemical reactors.

[1] E. V. Berlin, S. A. Dvinin, V. V. Mikheev et al, Plasma Physics Reports, 30, No. 12, 1043 (2004).

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