ION DENSITY IN THE STATIONARY MODE OF AN INDEPENDENT *E*×*B* DISCHARGE [[1]](#footnote-1)\*)

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As part of the work on the development of the plasma-optical mass separation method [1, 2], a one-dimensional stationary model of an independent discharge in a plasma accelerator with an anode layer is proposed, based on the inclusion of a cathode region whose size coincides with the distance from the cathode to the magnetron surface for electrons that arise at the cathode during ion-electron emission. In the existing models, this area is not considered; they specify the discharge current density *J*, which at the cathode is mainly determined by the ionic component, while the electronic component at the cathode is calculated by *J* under the assumption that the cathode is an unlimited reservoir of electrons [3, 4].

The model under consideration, firstly, allows us to formulate the ignition condition of the *E*×*B* discharge, in which all the main parameters of the discharge are tied: the discharge gap and voltage, the density of neutrals, the magnitude of the magnetic field induction, the frequency of collision of electrons with neutrals, the ionization frequency and the ion-electron emission coefficient. Secondly, *J* is not set, but is determined, and it depends on the conditions in the region of the anode – magnetron surface discharge gap. Considering the anode-magnetron surface region in the quasi-neutral approximation gives an unrealistically large *J* in comparison with the experimentally observed one. The solution of the Poisson equation (in the absence of quasi-neutrality) for the named region gives a significantly lower value of the discharge current density, which is consistent with experimental results. Such a stationary solution should be implemented evolutionarily from the moment of ignition of the discharge.

References

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLIX/Lt/ru/EK-Strokin.docx) [↑](#footnote-ref-1)