THE INFLUENCE OF A LONGITUDINAL MAGNETIC FIELD ON THE aCCELERATING PROCESS of the PULSE COAXIAL ACCELERATOR plasma [[1]](#footnote-1)\*)

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Pulsed plasma accelerators are used in such areas as creating of a neutron source and an X-ray source, materials hardening, and electric jet engine creating.

To transport the plasma flow after leaving the accelerator, a plasma duct in the form of a cylindrical vacuum chamber is usually used. One of the ways to reduce plasma energy losses on the chamber wall can be plasma magnetization by introducing longitudinal magnetic field into the plasma duct and the interelectrode gap of the accelerator. In addition, the introduction of longitudinal magnetic field into the accelerating channel can act as an additional mechanism for controlling the operating mode of the accelerator and, as a consequence, the output parameters of the plasma flow.

In our work we studied the effect of quasi-stationary longitudinal magnetic field on the dynamics of powerful plasma flows in the channels of pulsed plasma accelerators. In our experiments, hydrogen was used as the plasma-forming gas. The induction of the magnetic field in the accelerator and plasma duct varied from experiment to experiment in the range from 0 to 2.4 T. Meanwhile the fields in the accelerator channel and in the plasma duct could be varied independently.

Using a magnetic probe located in the interelectrode gap of the accelerator, the radial distributions of the longitudinal and azimuthal magnetic fields were measured during the motion of the plasma bunch in the accelerator channel.

Measurements carried out with a magnetic probe installed on the axis of the plasma duct at a distance of 1 meter from the end of the accelerator showed that the presence of quasi-stationary longitudinal magnetic field in the accelerator leads to an increase in the degree of plasma magnetization.

High-speed photographing of the interelectrode gap from the side of the output end of the accelerator in the light of lines of impurity gas (nitrogen) injected into the local region of the interelectrode gap was carried out. The speed of plasma rotation was determined by the speed of the glow region movement.

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References

1. Vasiliev V.I., Zhitlukhin A.M., Solovieva V.G., Skvortsov Yu.V., Umrikhin N.M., VANT, 1977, vol.1, p.19-24

1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVIII/Mu/ru/AI-Kochiev.docx) [↑](#footnote-ref-1)