Magnetic probe measurements OF THE PARAMETERS of the MOVING CURRENT shell ON THE PF MOL installation [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2020.47.1.089

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To study the processes in a plasma discharge of the plasma focus type (PF) during preliminary and pulsed filling of the chamber with a working gas, an experimental installation PF MOL with a working current up to 750 kA was built in the SRC RF TRINITI.

The geometry of the installation electrodes is consistent with the discharge characteristics of the power supply system. The elongated conical anode with a maximum diameter of 240 mm has a length of 430 mm. The cathode is made in the form of a cylinder with a length of 450 mm and an internal diameter of 310 mm. When a pulse valve is used, the gas is injected into the interelectrode gap towards the movement of the current shell.

To register the movement of the current shell at all discharge stages, 3 groups of magnetic probes are installed in the chamber: Z1–Z4, Zt and ZA. The construction of the probes is similar to those used in [1, 2]. Z1–Z4 probes are inserted through the vacuum chamber wall and side holes in the cathode, ZT probes are mounted on the side flange at different distances from the axis. Z1–Z4 and Zt probes can be inserted at different depths in the current shell. The third group of ZA probes is mounted on the anode at a distance of 60 mm from the axis. The ZA probe signal measurement system is isolated from the common ground of the installation with synchronization via the optical cable.

The work of PF with external gas injection for which separate experiments were previously performed by other authors is discussed [3]. The dynamics of the current shell motion in a gas with the pressure gradient increasing is studied. In different modes, the width of the current layer of the shell, its configuration at different times and the density of the residual gas behind the shell were estimated. In the experiments with deuterium the total neutron output level was measured.

Photographing of the plasma focus zone and plasma glow in the interelectrode gap was performed, the degree of azimuthal symmetry of the current shell was estimated.

References

1. V.I. Krauz, K.N. Mitrofanov, V.V. Myalton et al., Plasma Physics, 2010, t.36, № 11, p. 997–1012.
2. K.N. Mitrofanov, V.I. Krauz, P. Kubesh et al., Plasma Physics, 2014, t.40, № 8, p.721–737.
3. V.P. Bakhtin, YU.V. Skvortsov, N.M. Umrikhin, MJ capacitive energy store matching with dynamic load at puma installation. Plasma Devices and Operations, 1992, v. 2, p. 141–153.
1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVII/It/ru/CV-Krylov.docx) [↑](#footnote-ref-1)