Investigation of the SOL Plasma Flow IN THE GLOBUS-M TOKAMAK with A Mach probe [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2020.47.1.055

Khromov N.A., Tokarev V.A., Gusev V.K., Bakharev N.N., Kurskiev G.S., Minaev V.B., Patrov M.I., Petrov Yu.V., Sakharov N.V., Telnova A.Yu., Shchegolev P.B.

Ioffe Institute, St. Petersburg, Russia, [Nikolay.Khromov@mail.ioffe.ru](mailto:Nikolay.Khromov@mail.ioffe.ru)

As is known, plasma flow along the magnetic field lines in the scrape-off-layer (SOL) of tokamaks has a significant effect on impurity transport and transitions to improved confinement regime [1,2].

Globus-M is a compact spherical tokamak (major radius 0.36 m , minor radius 0.24 m) with an open divertor. The Mach number (*M||*) was measured using a movable multi-pin Langmuir probe, which was mounted at the midplane in the low field side of the tokamak and could rotate around its axis [3]. The Mach number was calculated from the ratio of ion saturation currents of the electrodes located on opposite sides of the ledge on the probe head [4]. Ion saturation currents were obtained from the current–voltage characteristics [5].

The experiments were carried out at various magnetic configurations (with lower and upper X-points) and plasma densities. On the whole, the measured radial profiles of the Mach number correspond to the results obtained on other divertor tokamaks: with a normal orientation of the toroidal magnetic field (the ion **B*×****∇B* drift is directed toward the X-point) the plasma flows in the direction from the outer to inner divertor target. The maximum value of *M||* (0.4-0.5) is observed at a distance of 10-15 mm from the separatrix.

The experimental work was performed on the Unique Scientific Facility "Spherical tokamak Globus-M", which is incorporated in the Federal Joint Research Center "Material science and characterization in advanced technology" (unique project identifier RFMEFI62119X0021) as part of the state task of the Ministry of Science and Higher Education of the Russian Federation.

References

1. LaBombard B. et al., Nucl. Fusion, 2004, **44**,1047.
2. Asakura N., Journal of Nuclear Materials, 2007, **363–365**, 41.
3. Tokarev V.A. et al., Journal of Physics: Conf. Series, 2018, **1094**, 012003.
4. Hutchinson I.H., Phys. Rev. A, 1988, **37**, 4358.
5. Boedo J. A. et al., Rev. Sci. Instrum., 2009, **80**, 123506.

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