

First results of plasma experiment on the spherical tokamak Globus-M2

V.B. Minaev¹, V.K. Gusev¹, N.V. Sakharov¹, Yu.V. Petrov¹, V.I. Varfolomeev¹,
N.N. Bakharev¹, E.N. Bondarchuk², F.V. Chernyshev¹, A.A. Kavin², N.A. Khromov¹,
G.S. Kurskiev¹, A.B. Mineev², A.N. Novokhatskii¹, K.Yu. Oshuev¹, M.I. Patrov¹,
P.B. Shchegolev¹, A.E. Shevelev¹, A.D. Sladkomedova¹, V.V. Solokha¹, A.Yu. Telnova¹,
V.A. Tokarev¹, S.Yu. Tolstyakov¹, E.G. Zhilin³

¹ *Ioffe Institute, St. Petersburg, Russia*

² *JSC «NII-EFA», St. Petersburg, Russia*

³ *Ioffe Fusion Technology Ltd., St. Petersburg, Russia*

The Globus-M2 spherical tokamak [1] is an upgraded version of the Globus-M machine [2] with substantial increase of engineering parameters (the toroidal magnetic field up to 1 T, the plasma current up to 0.5 MA). The goal of the project is to achieve the improved plasma performance with sub-fusion temperature value and collisionality much less than unity in compact geometry. Magnetic field and plasma current increasing in Globus-M2 led to complete redesign of the electromagnetic system as compared to Globus-M [3] due to new plasma equilibrium requirements and significant rise of the mechanical and thermal load. The upgraded machine was assembled by the end of 2017.

During first experimental campaign the toroidal magnetic field and plasma current were increased only to 0.6 T and 300 kA respectively. Ohmically and auxiliary heated plasma shots were performed. One neutral beam injector of 1 MW power with particle energy up to 30 keV was used. Limiter and divertor plasma magnetic configurations were available in experiment. Plasma density behaviour was controlled by means of RF reflectometer. Electron temperature and density profiles were measured with the help of Thomson scattering diagnostic. Two NPAs were used to investigate thermal and fast ion behaviour. Some other routine diagnostics such as SXR, D-alfa and neutron detectors were available too.

Promising improvement in plasma confinement was found. The results of first experimental campaign are discussed in the report and compared to Globus-M data.

References:

- [1] V.B. Minaev, V.K. Gusev, N.V. Sakharov, et al. // Nucl. Fusion, 57 (2017) 6, # 066047.
- [2] V.K. Gusev, V.E. Golant, E.Z. Gusakov, et al. // Tech. Phys., 44 (1999) 9, 1054.
- [3] V.K. Gusev, E.A. Azizov, A.B. Alekseev, et al. // Nucl. Fusion, 2013, 53 (9), #093013.