SIMULATION OF A NEUTRON EMISSION FROM PLASMA OF THE GLOBUS-M2 SPHERICAL TOKAMAK IN THE EXPERIMENTS WITH NEUTRAL INJECTION [[1]](#footnote-1)\*)

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Reconstruction of the Globus-M2 compact spherical tokamak [1], performed in 2018, includes the modernization of the electromagnetic system (increasing the plasma current up to 0.5 MA and toroidal magnetic field up to 1 T). As a result, the plasma parameters and the confinement of fast particles, arising from the neutral beam injection, were improved. This led to an increase in the total neutron yield [2]: fast ions interact with the ions of the main plasma and with each other, which leads to the production of neutrons due to the nuclear fusion reaction.

At present, measurements of neutron fluxes at the Globus-M2 facility are carried out using two corona counters with a polyethylene moderator and the neutron spectrometer. The source of fast particles is the injector of high-energy hydrogen or deuterium atoms with a power of up to 1 MW and a particle energy of 18-30 keV. In addition, a second injector is being prepared to launch. It will provide injection of hydrogen or deuterium with an energy of 20-50 keV and a power of up to 1 MW. Modeling of the behavior of fast ions is carried out using the NUBEAM code [3], which uses the reconstruction of the plasma magnetic configuration performed using the EFIT code [4], as well as information about the main parameters of the plasma: the value of the ion temperature measured using the Neutral Particle Analyzers or the Charge eXchange Recombination Spectroscopy; the spatial distribution of the electron concentration, measured using the diagnostics of Thomson scattering; effective plasma charge obtained from bremsstrahlung measurements. The result of the work of the NUBEAM code is the distribution function of fast particles. It is used in the implemented algorithm that calculates the spatial function of the neutron source. After calculating this neutron function, the simulation of neutron emission generation by the Monte Carlo method is carried out in order to determine the neutron flux to the detector. The simulation results are compared with the experimental data. The paper also examines the influence of toroidal Alfen modes on the neutron yield of the Globus-M2 tokamak.

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