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FORMATION OF A HIGH-DENSITY REGION ON THE STRONG MAGNETIC FIELD SIDE NEAR THE INNER DIVERTOR OF THE GLOBUS-M2 TOKAMAK *)

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This report presents the results of the study of the divertor plasma of the spherical tokamak Globus-M2, performed using Thomson scattering diagnostics (in the divertor[1] (DTS) and equatorial plane), an IR camera, and Langmuir probes. For the first time on a spherical tokamak, the formation of a high field side high density region (HFSHD) near the X-point was discovered, which was confirmed through modeling using the SOLPS-ITER code[2-3]. Experimental measurements showed a significant increase in electron density in the inner divertor compared to the equatorial plane at equivalent flux coordinates.

The research was carried out under various plasma heating scenarios, including both ohmic heating and additional neutral beam injection heating. The laser frequency (Nd:YAG *1064 nm / 2 J / 100 Hz / 3 ns*) of the DTS made it possible to obtain 5-7 temporal points per discharge. Scattered radiation was collected from 7 spatial points in the divertor and 5 points in the equatorial plan. Polychromators were used as measurement devices[4]. The load on the divertor plates was measured using an IR camera.

In the analyzed discharges (magnetic field 0.7 T, plasma current ~300 kA), the typical scenario was as follows: by 160 ms into the discharge, a divertor configuration was established, after that the electron density on the inner leg began to increase significantly, while the density on the separatrix in the equatorial plane remained nearly unchanged. The observed peak electron density n_e in the inner divertor, which exceeded the n_e measured at the same magnetic surface in the equatorial plane on the outer leg, was associated with the formation of the HFSHD region.

The obtained results confirmed the existence of the high field side high density region (HFSHD), which is of great importance for understanding plasma behavior and stability in spherical tokamaks.

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