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STUDY OF THE RADIAL ELECTRIC FIELD DURING EDGE LOCALIZED MODES ON GLOBUS-M2 TOKAMAK *)

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The main operating mode of tokamaks nowadays is the high confinement mode or H-mode [1]. It is believed that during the transition to H-mode, the profile of the radial electric field E_r changes and, due to this, the flows at the plasma periphery change. This, in turn, leads to the suppression of turbulence and the formation of an edge transport barrier. Various magnetohydrodynamic instabilities, such as edge localized modes (ELMs), can lead to changes in E_r and, consequently, to changes in the plasma confinement regime [2]. In addition, the radial electric field is also involved in many other processes in the plasma. For example, it affects the confinement of fast particles. Therefore, the study of E_r is an important and relevant task at present.

This paper presents a study of the radial electric field during edge localized modes in the H-mode on the spherical tokamak Globus-M2 [3]. The well-established multi-frequency Doppler backscattering diagnostics is used to obtain E_r values [4]. The diagnostics is based on the study of electromagnetic radiation backscattered on fluctuations of concentration. The diagnostics allows measuring the plasma rotation velocity in crossed electric and magnetic fields while neglecting the phase velocity of fluctuations. Knowing the magnetic field at the cutoff point, it is possible to calculate E_r. Due to the use of several probing frequencies, it is possible to construct a profile of E_r, which was done for a large number of ELMs in different discharges of the Globus-M2 tokamak. The profiles averaged for the same-type ELMs were obtained. They demonstrate an increase in the radial electric field modulus at all studied radii (up to 8 cm inside from the separatrix) during the burst of edge localized modes. In addition, the E_r behavior during the transition to the high confinement mode was investigated. It was shown that a «well» appears in the radial electric field profile, which is consistent with experimental data from other tokamaks [5].

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