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Investigation of a Phenomenology of the Improved Confinement Regime in T-11M Tokamak

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Regimes of discharge of improved plasma confinement were found in the experiments with a vertical lithium limiter on T-11M tokamak, which was manifested in spontaneous growth of the electron density up to the limit Greenwald and above. Previously, such modes arising after chamber lithiization were observed in the tokamak FTU. The analysis of data obtained in T-11M has showed that this regime of improved confinement is differed from the ordinary mode (L-mode) by the sharp profile of the plasma density $N_e(r)$, relatively high values of $N_e(0)$ in the center and ordinary density values $N_e(a)$ in the edge of plasma, as if there is an internal transport barrier in the center. Another visible difference of this mode from L-mode is a significant increase of soft X-rays power from the center, while maintaining or even reducing $Z_{eff}(0)$. In the central region of plasma the lifetime of particles is increased by approximately twice. The energy lifetime is increased by 30-40%. Major differences of the regime of improved confinement from remarkable limiter H-mode observed in T-11M, for example, after boronization are peaking of the density profile, absence of active ELMs and collection of impurities in the plasma center. An analogy of such regimes is carried out with previously detected on the Alcator C-Mode I-mode.

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