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Effect of Horizontal Displacement on Fast Ion Confinement in TUMAN-3M

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The investigation of the behavior of fast ion (FI) is among the most important directions of research in the field of magnetic plasma confinement. Study the FI confinement in compact tokamak with relatively low toroidal magnetic field is topical in view of the increasing interest in developing neutron sources based on the nuclear fusion reactions. Capture efficiency of FI and thermalization one was studied in present experimental series by mean of neutron rate measurement. The temporal evolution and the absolute magnitude of the neutron emission were detected by He3 gas discharge detector. Regression analysis of the experimental data with available plasma and heating beam parameters in TUMAN-3M tokamak gives dependence of neutron rate on engineering parameters. The empirical scaling expression indicates expected strong dependence of neutron emission rate on toroidal magnetic field and beam energy. Results of experimental study of influence of plasma position along major radius on the efficiency of plasma heating and fast ions confinement are presented. Plasma shift inwards along the major axis led to the increase of the electron temperature from 300eV to 400eV and results in 20% increase in neutron emission rate. Increase of neutron rate indicates on improvement of fast ion confinement.

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