MASSIVE GAS INJECTION INto T-10 AND T-15MD TOKAMAKs [[1]](#endnote-1)\*)

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Massive gas injection is one of the areas of research of disruptions of a plasma discharge and runaway electron beams. Such injection is suitable both for initiating the disruption and formation of runaway electron beams and for preventing or mitigation the disruption and suppression of runaway electron beams [1].

Experiments on massive gas injection were carried out on the T-10 tokamak using both stationary and movable gas valve [2]. Another technique that was used in experiments on the T-10 tokamak was a fuel pellet injector with a chord injection system [3, 4].

The results of experiments on the T-10 tokamak demonstrated that the approach of the movable valve to the boundary of the plasma column leads to more intense thermal and current quench. In the current quench, there is a dependence of the current decay rate on the valve position. The possibility of converting the current quench from slow to fast by means of massive gas injection during disruption was registered. On the basis of these experiments, a configuration of the technique for gas injection into the T-15MD tokamak was proposed.

A feature of the injection complex on the T-15MD tokamak will be its location in one section, which will make it possible to locate part of the auxiliary and detecting equipment in the same section to provide various injection options. Unlike the T-10 tokamak, the movable valve on the T-15MD tokamak is planned to be installed in the upper vertical port. The presence of a gas treatment module will ensure experiments with gas mixtures. Start of tokamak operation in the divertor mode will make it possible to carry out research on gas injection into the region of the divertor and X-point in order to initiate detached regime.

The capabilities of the injection complex at the T-15MD tokamak will make it possible to study scenarios of optimal plasma quenching, including preventing the formation and suppression of the generated runaway electron beams.

The simulation of the past experiments on the T-10 tokamak and the upcoming experiments on the T-15MD tokamak was carried out using the ASTRA code [5]. The modeling uses the ability to add up to three impurity to the code. By selecting the sources of impurity and transport coefficients, the development of thermal quench is modeled.

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References

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