STUDY OF OFF-CENTRAL PELLET-INJECTION IN TOKAMAK T-10 [[1]](#footnote-1)\*)

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The T-10 tokamak used a complex of pellet-injection, which made it possible to carry out various options for the injection of hydrogen and impurity pellets, photo and video recording of their evaporation in a plasma [1], to influence on the confinement of particles in a plasma [2, 3], and use injection to control a quench of a plasma discharge [4], as well as off-center chord injection [5] to form regions with a strong plasma density gradient.

For the implementation of off-center injection, a chord injection system was used, which was installed in the diagonal port +30° (port for connecting the hydrogen pellet-injector) and made it possible to deflect pellets injected from the injector by a predetermined angle in the vertical plane. This allowed injection with an impact parameter in the range from -ri to + ri, where ri is the radius for the maximum deviation of the pellets, which corresponded to the radius of the last closed magnetic surface. The sign of the impact parameter determines the direction of injection relatively to the direction of the poloidal rotation of the plasma. The minus corresponds to counter-pellet injection, i.e. injection in the direction against the poloidal rotation, and plus defines co-pellet-injection, in this case the directions of injection and poloidal rotation coincide.

The use of off-central injection allows the long-term evaporation of a hydrogen particulate in the region of the same magnetic surface, with respect to which the particulate moves tangentially. This leads to the addition of a large amount of substance in the indicated region, the formation of strong density gradients, the cooling of this magnetic surface and depletion of it by hot electrons. As a result, large values ​​of density and temperature gradients are formed, which in turn lead to the appearance of a strong radial electric field and increase the shear of the poloidal rotation, which leads to the suppression of certain mechanisms of radial transport [2, 3].

Experiments using a chordal injection system made it possible to compare standard injection of pellets along the central chord with off-center injection, including the regime with ECR plasma heating. The deflection of the pellets by half of the small radius and the maximum value was used [3, 5]. A longer radiation of the Dα line was recorded in the case of off-center injection.

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References

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