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STRUCTURE AND CAPABILITIES OF THE INJECTION COMPLEX *)

[1]Kapralov V.G., [2]Dremin M.M., [2]Krylov S.V., [1]Sergeev V.Yu., [2]Trubnikov A.S.

[1]SPbPU, Saint-Petersburg, RF, v.kapralov@spbstu.ru
[2]NRC «Kurchatov Institute», Moscow, RF, Dremin_MM@nrcki.ru

Injection systems for gas jets and pellet-injection are used to conduct research at almost all modern hot plasma installations. They allow solving technological problems and performing diagnostic studies [1, 2]. The report discusses the injection complex developed at SPbPU, the structure and main capabilities of its systems.

The injection complex includes equipment for various gas injection options: a stationary gas valve, a movable gas valve and a piezo valve. For the pellet-injection, a solid hydrogen pellet injector, an impurity pellet injector, and a lithium pellet injector have been developed. Additionally, injection channel switch unit and a device for chord pellet injection, as well as a microwave scales for non-contact measuring the mass of pellets and a system for predicting events in the plasma for triggering injection have been developed for the solid hydrogen pellet injector.

The injector of hydrogen pellets makes it possible to fuel the main component of the plasma (hydrogen isotopes), as well as, using a chord injection unit to form a transport barrier and initiate the transition to the improved confinement mode [3], to perform radial transport studies using created disturbances [4] and to initiate the formation of a peak plasma density profile. Also, the chord injection unit makes it possible to study the co- and counter-injection of pellets in relation to plasma rotation. The use of a channel commutator makes it possible to perform fuelling from the high field side, which significantly increases the efficiency of injection, as well as to inject pellets in the area of the divertor and X-point, including for the purpose of forming a detachment mode. An injector of impurity pellets allows to study the transport of impurities in plasma [5].

A movable gas valve destined to place the source of the supersonic jet at the edge of the plasma, which increases the injection efficiency and reduces the delay of gas entry into the plasma. Massive gas injection can be used to quench a plasma discharge and to suppress runaway electron beams during plasma disruption [6].

The described injection complex and its components are planned for use at existing and future thermonuclear installations in the Russian Federation - T-15MD, Globus-M2, TRT.

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