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STUDY OF PLASMA PARAMETERS OF THE HIGH-FLUX SOURCE "GPI-2": RESULTS OF THE FIRST STAGE OF MODERNIZATION *)

Stepanov N.O., Cherkez D.I., Spitsyn A.V.

NRC “Kurchatov institute”, Moscow, Russia, Stepanov_NO@nrcki.ru

One of the priority tasks in designing next-generation fusion reactors is to study the interaction of plasma with facing materials (PFM). Thus, PFM during reactor operation will interact with large stationary thermal and corpuscular flows, which will lead to surface erosion, displacement of atoms from crystal lattice sites and activation. In addition, processes of capture with subsequent diffusion of the heavy hydrogen isotope - tritium - into the coolant will occur, affecting fuel recycling and imposing additional restrictions related to radiation safety, and the combined effect of all these factors can provoke new negative effects [1]. Despite the importance of studying the interaction of plasma with PFM, fusion reactors in operation today are not able to provide the required plasma flow parameters and pulse duration at the level expected in ITER and DEMO. Therefore, it is advisable to create stationary high-flux plasma installations. Thus, experimental sources based on RF generators are capable of creating high-density plasma ($10^{11} \div 10^{13}$ cm^{-3}) without foreign impurities associated with the destruction of the electrode [2], and also have a number of other advantages.

To conduct research on the interaction of deuterium plasma with fusion materials, a stationary high-flux plasma source "GPI-2" was created at the NRC "Kurchatov Institute". The RF subsystem of the experimental setup includes a generator (maximum output power – 2 kW, operating frequency – 13,56 MHz), an automatic matching device and a water-cooled half-wave antenna (antenna type – H-H, symmetry – m = +1) [3]. At present, the first stage of the modernization has been fully completed, during which: an additional magnetic field coil was installed (maximum magnetic field on the axis, B = 0,4 T); the vacuum linear displacement input and the diagnostic complex placed on it were modified; a new support frame was assembled. Before measuring the plasma parameters, the following were redefined: the pressure of the working gas, deuterium, and the linear profile of the magnetic field, at which the maximum specific ion current was observed. As a result of the modernization of the experimental stand "GPI-2", it was possible to increase the ion current and electron densities in the area of the experimental sample holder installation up to 344 mA/cm^2 and $1 \cdot 10^{12}$ cm^{-3}, respectively, against 18 mA/cm^2 and $1 \cdot 10^{11}$ cm^{-3} in the previous configuration.

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