INVESTIGATION OF THE DYNAMICS OF THE SURFACE TEMPERATURE OF A TUNGSTEN TARGET EXPOSED TO POWERFUL HYDROGEN PLASMA FLOWS BY SPECTRAL PYROMETRY [[1]](#footnote-1)\*)

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The successful completion of the ITER project largely depends on the correct choice of plasma-facing materials of the first wall of the tokamak vacuum chamber. To justify choice of materials it is necessary to obtain experimental data about the behavior of materials under the action of intense plasma flows, especially the temperature on their surface. [1,2]. The report presents the results of a study of temperature dynamics on the surface of a tungsten target under the influence of powerful plasma flows by spectral pyrometry. In addition, the results of the influence of the gas jet in front of the target surface on the temperature dynamics are shown.

The plasma flow with a velocity of (4÷6) × 107 cm ∙ s-1 and an energy content of about 50 kJ was created by a pulsed electrodynamic accelerator MK-200 (SRC RF TRINITI). Hydrogen was used as a plasma-forming gas. The plasma stream was transported in a longitudinal magnetic field with an induction of ≤ 2 T. A supersonic nitrogen/neon gas jet was directed along the surface of the tungsten target by a flat Laval nozzle. The maximum density in the gas jet reached 1017 cm-3 with a jet thickness of ≈ 5 cm and a width of ≈ 15 cm. A tungsten target measuring 120 mm × 140 mm was located at a distance of 40 mm from the axis of the gas jet.

An infrared pyrometer was developed to determine the temperature dynamics on the target surface. Its schematics, calibration method and a method for conducting experiments are presented. The dependences of the target surface temperature on time were determined, and the value of the tungsten emission coefficient depending on the wavelength was estimated. It is shown that the use of a gas curtain significantly reduces the heating of the tungsten target surface. At the same time, with an increase in the density of the gas used, the maximum temperature reached decreases.

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References

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/L/E/ru/IN-Lidzhjgoryaev.docx) [↑](#footnote-ref-1)