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HELICON PLASMA STUDIES BY MEANS OF EMISSION SPECTROSCOPY METHODS [*)]

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Plasma creation by means of helicon waves has become widespread - from the use of helicon plasma to solve materials science problems in the production of microcircuits to plasma space engines [1]. The Kurchatov Institute created installations PS-1 and PN-3 [2], intended for experimental research of plasma processes in a helicon discharge as part of the program for testing prototypes of plasma rocket engines. The report presents the results of using optical emission spectroscopy methods to determine the plasma parameters of the mentioned installations. The working gases were argon, helium and hydrogen.

Measurements of Doppler line profiles of helium and argon atoms and ions were carried out depending on such parameters as the magnetic field strength, working gas flow rate and input power.

The measurements were carried out using a spectrograph-monochromator SolarLS M-522. Gratings of 2400 and 1200 lines/mm were used, the entrance slit of 10 to 50 μm, which determined the hardware function of the device with a width at half maximum in the range from 10 to 25 pm in the regions of the visible spectrum of interest to us. The hardware function was determined by the emission of metal lines (Cu I and Ag I), as well as a helium-neon laser for the red region of the spectrum.

The measured temperatures of atoms and ions [3] are in the limit of up to 4 eV for the helium ion He II and up to 5 eV for the argon atom Ar I.

References

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