DEVELOPMENT OF A DIAGNOSTIC COMPLEX FOR THE STUDY OF PLASMA PROCESSES IN AN ELECTRODELESS PLASMA THRUSTER MAGNETIC NOZZLE [[1]](#footnote-1)\*)

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At the stand PN-3, research is being carried out in support of the creation of a domestic electrodeless plasma thruster (EPT). One of the tasks to be solved is to study the physical processes occurring in the magnetic nozzle of the EPT, in particular, the acceleration and detachment of the outflowing plasma flow from an inhomogeneous magnetic field lines.

The magnetic nozzle can be divided into three areas. The first region is located in the throat of the magnetic nozzle, and here it is necessary to determine in which plasma component the RF energy is absorbed, as well as the radial distributions of the plasma flow parameters at the entrance to the magnetic nozzle. The second area represents the rest of the magnetic nozzle. In this region, it is required to build two-dimensional maps of all plasma flow parameters, tracing the evolution of these parameters as the plasma flow expands in the magnetic nozzle. The third region is located at a distance from the nozzle throat, which guarantees the plasma flow detachment from the magnetic field lines. Here, the final energy distribution function of ions, the created thrust, and the angle of separation of the plasma flow from the magnetic field lines are measured.

A diagnostic complex for the study of plasma processes in a magnetic nozzle has been developed. It includes: a diamagnetic coil (plasma flow energy content change), moving probes (two-dimensional maps of plasma parameters - electron temperature and density, plasma flow) and special (ion distribution function for rotational energy) probes, optical emission spectroscopy (radial distributions of electron temperature , density and plasma composition, its ionization degree), laser-induced fluorescence (radial distribution of plasma density), microwave interferometer (time evolution of the linear plasma density), grid and electrostatic analyzers (local ion energy distribution function), tensometric thrustmeter (local thrust density, whole generated thrust), anglemeter (local motion angle of plasma flow ions, plasma flow detachment angle from magnetic field lines), and the possibility of using other diagnostics is also discussed.

This diagnostic complex makes it possible to carry out the necessary studies in all three areas of the magnetic nozzle and can be considered as a standard complex for studying physical processes in the EPT magnetic nozzle.

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