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HF PLASMA HEATING IN THE PLM-M INSTALLATION FOR ACCELERATION OF STATIONARY PLASMA FLOWS *)

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The PLM-M facility [1] at MPEI is used to study the generation and acceleration of stationary plasma flows for the development of magnetoplasmadynamic accelerators [2]. The facility is equipped with two solenoids and an eight-pole multicusp system that form the configuration of the plasma nozzle. In the center of the solenoids, the magnetic field reaches 35 mT and up to 0.2 T in the cusp zone, in the region of plasma outflow into a large vacuum volume (receiver) – up to 5 mT. In the main magnetic confinement volume, the plasma flow has a diameter of 3.5 cm. A cooled helicon antenna, which is installed in a deep vacuum section, is used for additional radio-frequency heating of the plasma. Water cooling is used to ensure stationary operation of the helicon antenna, plasma heating system, vacuum chamber and facility support systems. The parameters of the stationary plasma flow in the receiver region of the PLM-M facility were measured using probe and optical methods: electron concentration ~10^{12} cm^{-3}, electron temperature ~2 eV. To increase the jet thrust of the plasma flow, it is proposed to use the induction effect creating circular current loops in the plasma and their longitudinal acceleration due to the radial component of the magnetic field in the cusps.

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