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MEASUREMENT OF PLASMA PARAMETERS BY PROBE METHOD UNDER CONDITIONS OF HF HEATING OF PLASMA BY HELICON ANTENNA IN PLM-M INSTALLATION ^{*)}

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For a fusion reactor-tokamak, research on methods of additional plasma heating is necessary. In this work, we tested power input using a helicon antenna in the stationary plasma of the plasma system PLM-M (plasma linear multicasp) [1], which is one of several unique plasma systems that allows obtaining parameters similar to the peripheral plasma of a large tokamak.

The RF plasma heating system (Fig. 1) consists of a working chamber, which is transparent to electromagnetic radiation; a helicon antenna; an RF source; and a matching system. The helicon antenna has a length of 100 mm and an inner diameter of 78 mm, and is made of a copper tube with a diameter of 6 mm. Energy from the RF source, which has an internal impedance of 50 ohms, 4kW power is injected into the plasma through the helicon antenna at 27.12 MHz in the form of a helicon wave. The matching system links the antenna and the RF generator and allows the complex load impedance to be equal to the RF generator impedance to eliminate power losses. A matching system was developed for manual regulation.

In the course of experiments with a helicon antenna using probe diagnostics, the main plasma parameters in the PLM-M setup were determined: plasma density $(1-10) \cdot 10^{19} \text{ m}^{-3}$; plasma temperature more than 10 eV; plasma cord diameter - 3.5 cm. Also, the statistical and spectral characteristics of the plasma were determined from the plasma discharge cross section and compared with the data obtained in the absence of additional plasma heating.

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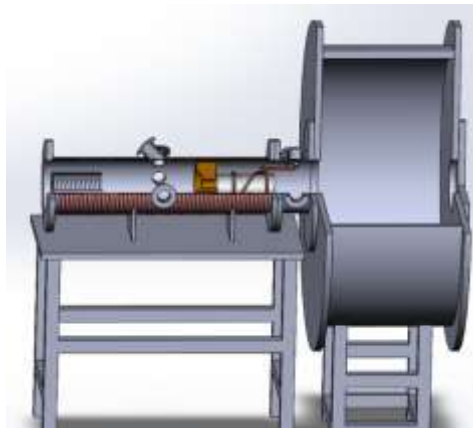


Fig. 1. 3D model of the RF heating system in the PLM-M unit

References

- [1]. Budaev V.P. et al. VANT ser. Thermonuclear fusion. -2017. -T.40, №3. -C.35

^{*)} [abstracts of this report in Russian](#)