DOI: 10.34854/ICPAF.51.2024.1.1.077

PROBE MEASUREMENTS AT THE GOL-NB INSTALLATION *)

Sidorov E.N., Batkin V.I., Ivanov I.A., Kuklin K.I., Melnikov N.A., Nikishin A.V., Polosatkin S.V., Postupaev V.V., Rovenskikh A.F., Skovorodin D.I.

Budker Institute of Nuclear Physics SB RAS, E.N.Sidorov@inp.nsk.su

The report presents the results of a study of the process of plasma accumulation in the central trap of the GOL-NB installation, carried out using Langmuir and Mach probes.

The GOL-NB installation [1] was created at the Budker Institute of Nuclear Physics and is intended to demonstrate the suppression of longitudinal plasma losses by sections with a corrugated magnetic field [2]. It is a gas-dynamic trap with solenoids attached on both sides, which can either create a uniform magnetic field with $B \approx 4.5$ T, or a corrugated field with the same induction with a corrugation period of 22 cm. The starting plasma is created by an arc plasma gun, and its heating is carried out by a pair of neutral beams with energy up to 25 keV and total power up to 1.1 MW.

Each of the probes consists of a measuring head and a probe control unit. The design of the Langmuir probe is unique [3] and is a four-electrode probe that measures density, temperature and radial electric field. The Mach probe is a classic. The Wi-Fi control and data transmission unit is located in an electrically insulated metal box with a low capacitance to ground [3].

Using Langmuir and Mach probes, the radial profiles of the plasma flow entering and exiting the central trap were determined. The difference between the inlet and outlet flow was compared with an estimate of plasma accumulation made from the attenuation of the heating beams. From the constructed balance, transverse plasma losses were determined. Measurements made when the installation was operating in the mode of a corrugated magnetic field in the end solenoids are compared with the results of similar measurements in a uniform field.

Reference

[1]. Postupaev V.V., et al., Nucl. Fusion 62, 086003 (2022).
[2]. Бурдаков А.В., Поступаев В.В., УФН 188, 651 (2018).
[3]. Sidorov E. N., et al., J. Instrumentation 16, T11006 (2021).

*) abstracts of this report in Russian