

直線装置 HYPER-II を用いた発散磁場領域のイオン流れ構造に関する初期実験 Experimental studies on ion flow structure formation in a diverging magnetic field with the HYPER-II device

Kenichiro TERASAKA, Yuki SAKAMOTO, Masayoshi Y. TANAKA, Shinji YOSHIMURA¹, and Mitsutoshi ARAMAKI²

Kyushu Univ., ¹NIFS, ²Nagoya Univ.

Recently, we have experimentally observed an ion streamline detachment from the magnetic field line in a diverging magnetic field of an ECR plasma [1]. The difference of motion between the magnetized electrons and the detached ions is produced in the detachment region. The characteristic of flow structure in the detachment region is different from that in the magnetized region. The flow structure formation in the detachment region, however, has not been fully understood, so far.

In order to study the flow structure in diverging magnetic field including magnetized and detachment regions, we have started an experiment with a new experimental device, the High-density Plasma Experiment-II (HYPER-II) device, at Kyushu University. A picture of the HYPER-II device is shown in Fig. 1. The HYPER-II device consists of two parts of cylindrical vacuum chamber: one is the plasma production chamber (0.3 m in diameter and 1.07 m in axial length), and the other is the diffusion chamber (0.76 m in diameter and 1.2 m in axial length) connected to the plasma production chamber. A diverging magnetic field is produced by eight magnetic coils, and attainable magnetic field strength in the experimental region is 0.005 T to 0.1 T.

We, here, show an example of preliminary result of flow velocity measurement with a directional Langmuir probe (DLP). Figure 2 shows the ion saturation current of DLP (I_{is}) as a function of probe angle (θ_p). When $\theta_p = 0$ deg., the collection hole of DLP faces to the strong magnetic field side ($-z$ direction). As seen this figure, the ion flow from the strong field side to the weaker field side was observed. The details will be presented in the poster session.

[1] K. Terasaka *et al.*, Phys. Plasmas **17**, 072106 (2010).

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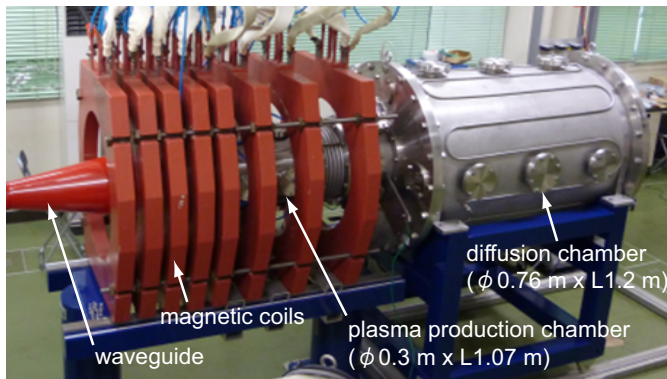


Fig. 1: A picture of the HYPER-II device.

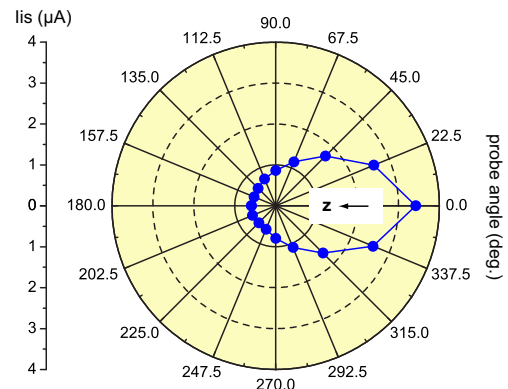


Fig. 2: A polar plot of DLP current.