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GAMMA10/PDXのガスパフ及び追加熱時における ダイバータ模擬プラズマの電子温度・密度計測
Electron temperature and density measurement of divertor simulation plasma in gas-puff and additional heating on GAMMA 10/PDX

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In large tandem mirror device GAMMA 10/PDX, divertor simulation experiments have been promoted using an end region with open magnetic field configuration [1,2]. One of the advantages of GAMMA 10/PDX over other small divertor simulators is existence of confined core plasma with high ion and electron temperature (up to ~ 10 keV and ~ 100 eV, respectively). Moreover, GAMMA 10/PDX has various high-power heating systems of ECH (electron cyclotron heating), ICRF (ion cyclotron range of frequency) and NBI (neutral beam injection), which lead to good controllability of plasma parameters and the ITER-relevant heat flux to the end region. Recently, a divertor simulation experimental module (D-module, Fig 1) has newly been installed at the end region. A variety of experiments about divertor physics and PWI can be carried out using the D-module.

In this work, electron temperature T_e and density n_e in the D-module are measured in experiments where the additional gas-puff and heating systems are applied for higher density and/or higher particle and heat flux in order to make the parameters closer to actual divertors. Figure 2 shows dependence of T_e and n_e measured by a Langmuir probe on the target plate in the D-module on the injection time width of H_2 gas-puff in the D-module without and with an additional ICRF. The higher the time width of the gas-puff, the higher n_e is and the lower T_e is. n_e is also increased with the additional ICRF.

In this presentation, we will also show results with other additional heating systems (ECH, ICRF, NBI) and gas-puff in other places of GAMMA 10/PDX, along with the spatial distribution of T_e and n_e in the D-module and its dependence on the heating and gas-puff conditions. We will discuss physical behavior of the higher-density divertor simulation plasmas.

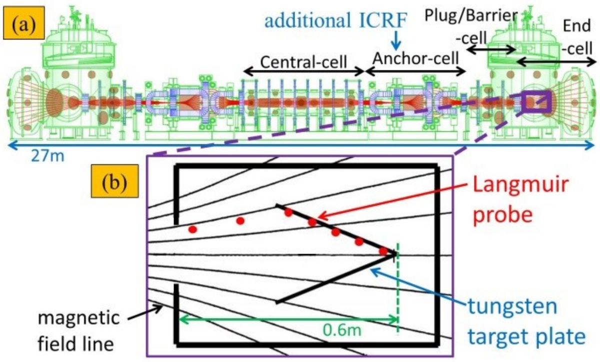

Fig. 1. Schematic views of GAMMA 10/PDX (a) and D-module (b).

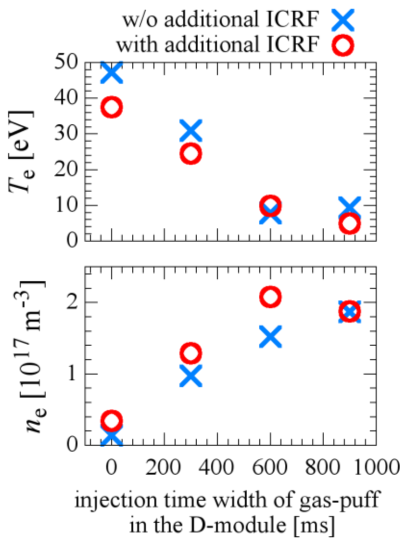

Fig. 2. Dependence of T_e and n_e near the target plate on the injection time width of gas-puff in the D-module.

[1] Y. Nakashima *et al.*, Fusion Eng. Design **85**, 956 (2010).

[2] Y. Nakashima *et al.*, J. Nucl. Mater. **415**, S996 (2011).