

GAMMA 10/PDX 実験におけるカロリメーターを用いた熱流計測 Heat Flux Measurement by Using Calorimeter in GAMMA 10/PDX experiments

岩元美樹¹、中嶋洋輔¹、松浦寛人²、武田寿人¹、細井克洋¹、市村和也¹、木暮 諭¹、
高橋樹仁¹、細田甚成¹、清水啓太¹、蔣 佳希¹、長屋孝信¹、大木健輔¹、長塚 優¹、
吉川基輝¹、坂本瑞樹¹、市村 真¹

IWAMOTO Miki¹, NAKASHIMA Yousuke¹, MATSUURA Hiroto², TAKEDA Hisato¹, HOSOI Katsuhiro¹, ICHIMURA Kazuya¹, et al.

¹筑波大学プラズマ研究センター、²大阪府大学放射線研究センター

¹ PRC, Univ. Tsukuba ² RRC, Osaka Pref. Univ.

The divertor is an essential part in the toroidal fusion reactor where the plasma flowing from core plasma contacts and exposed to high heat load of tens MW level in a steady state. One of the methods to reduce the heat load to the divertor is to promote the radiation loss of plasma energy and make detached plasma.

In the tandem mirror device GAMMA 10/PDX in University of Tsukuba, divertor simulation experiment has been conducted [1-3]. In order to investigate the behavior of end-loss plasma which is equivalent to SOL plasmas, a V-shaped target plate which simulates divertor plate is mounted in newly designed divertor simulation experimental module (D-module) installed at the exit of west end-mirror coil of GAMMA10/PDX. The advantage of performing divertor simulation experiment in GAMMA 10/PDX is that high-energy plasma with an ion temperature 100~400 [eV] can be generated by using various plasma-heating devices. The angle of V-shaped target plate is changeable from 15 to 80 degrees. Gas injection port and 13 calorimeters are installed on the target plate. Calorimeters consist of stainless steel substrate ($\phi 10\text{mm}$, 0.2mm in thickness) which is connected to thermocouple. The heat flux is evaluated from temperature difference (ΔT) between before and after plasma discharge.

In this experiment, the spatial distribution of the heat flux is measured in the cases that impurity gas (Ne, N₂, Ar) is injected and without gas injection under the conditions of the target angle in 30, 45 and 60 degree. In the case without gas injection, it is found that the peak position of the heat flux along the machine axis

moves toward the plasma downstream according to increasing the angle. The dependence on various gases and the amount of gas is also investigated. In the poster session detailed results and discussion about the forming mechanism of the heat flux distribution are to be presented.

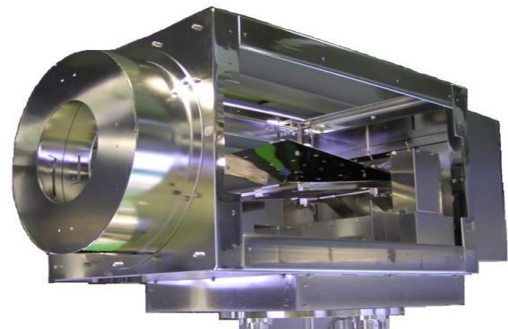


Fig 1 Divertor simulation experimental module (D-module). A V-shaped target plate which made of tungsten is mounted in D-module.

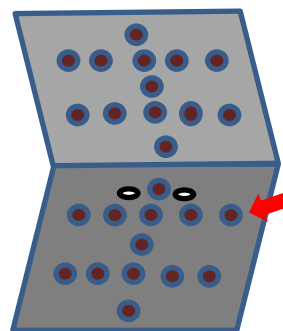


Fig 2 Schematic view of a V-shaped target. Calorimeters are on the lower surface of it.

- [1] Y. Nakashima, et al., Fusion Eng. Design volume **85** issue 6 (2010) 956.
- [2] Y. Nakashima, et al., Trans. Fusion Sci. Technol. **59** No.1T (2011) 61.
- [3] Y. Nakashima, et al., J. Nucl. Mater. **438** (2013) S738.