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GAMMA 10/PDXにおけるターゲット板前面のHα線強度の空間分布計測
Measurement of spatial distribution of Hα line intensity in front of the target plate in GAMMA 10/PDX

野原涼[1)]、坂本瑞樹[1)]、寺門明紘[1)]、大木健輔[1)]、細井克洋[1)]、木暮諭[1)]、武田寿人[1)]、市村和也[1)]、長塚優[1)]、吉川基輝[1)]、水口正紀[1)]、古館謙一[1)]、加藤太治[2)]、坂上裕之[2)]、吉川正志[1)]、中嶋洋輔[1)]、今井剛[1)]、市村真[1)]
NOHARA Ryo[1)], SAKAMOTO Mizuki[1)], TERAKADO Akihiro[1)], OKI Kensuke[1)],et al.

1) 筑波大学プラズマ研究センター, 2) 核融合科学研究所
1) Univ. Tsukuba, 2) NIFS

Plasma-wall interaction (PWI) is an important issue for stable sustainment of confined plasma. In the tandem mirror device GAMMA 10/PDX, we have studied edge plasma for understanding of PWI phenomena such as hydrogen recycling. In this study, we inserted a target plate of tungsten or carbon in the west-end region of GAMMA 10/PDX, and observed the profile of Hα line intensity in front of the target plate with a high-speed camera as shown in Figure 1.

Figures 2 and 3 show the Hα line intensity at x=0 (i.e. center of the target) as a function of z in the case of tungsten and carbon targets, respectively. z=0 means the target surface position. The solid lines in Fig.2 and Fig.3 are fitting lines that are drawn by using an exponential function. In the case of the tungsten target plate (W-target), we observed two decay components. The shorter decay length is about 5mm and the longer one is about 80mm. In the case of the carbon target plate (C-target), on the other hand, there is only one decay component, which is about 80mm.

Considering the normal plasma parameter in GAMMA 10/PDX, the observed decay length is much shorter than the mean free path of excitation (n=3) for the neutral hydrogen atom reflected on the surface, suggesting that the reflected hydrogen atoms were at excited state due to the collision with the target.

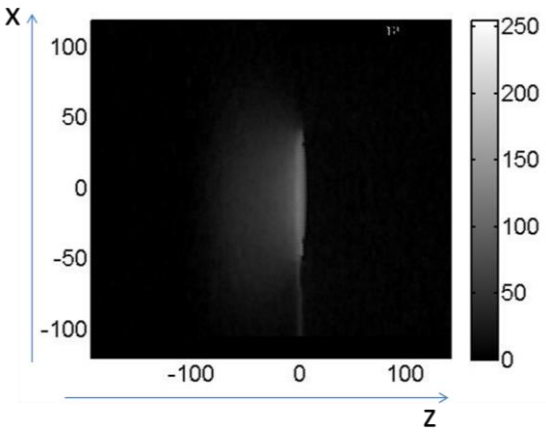

Fig.1 Camera image of Hα line intensity in front of the target plate.

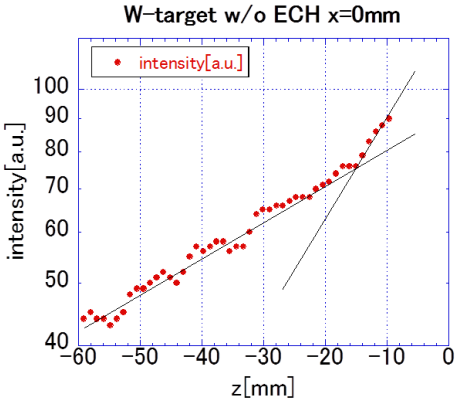

Fig.2 Hα line intensity at x=0 (i.e. center of the target) as a function of z in the case of tungsten target plate.

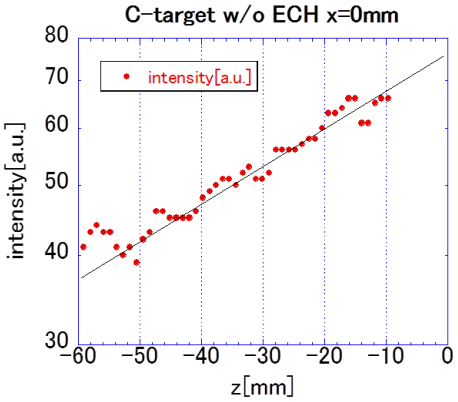

Fig.3 Hα line intensity at x=0 as a function of z in the case of carbon target plate.