

高速カメラ計測によるヘリオトロンJ周辺プラズマ揺動中の
フィラメント構造特性の解析

**Characteristics of filamentary structures in Heliotron J edge plasma observed
with a fast camera**

笠嶋慶純¹, 水内亨², 大島慎介², 西野信博³, L. Zang¹, 沙夢雨¹, 小田大輔⁴, 南貴司²,
小林進二², 長崎百伸², 門信一郎², 岡田浩之², 山本聡², 釘持尚輝¹, 大谷芳明¹, 佐野匠¹,
野口直樹¹, 原田伴譽¹, 丸山正人¹, 桐本充晃¹, 鈴木文子¹, 程崧明¹, 呂湘浔¹, 安枝樹生¹,
中村祐司², 木島滋², 佐野史道²

K. KASAJIMA¹, T. Mizuuchi², S. Ohshima², N. NISHINO³, L. ZANG¹, *et al.*

京大院エネ科¹, 京大エネ研², 広大院工³, 京大工学部⁴

GSES, Kyoto Univ.¹, IAE, Kyoto Univ.², GSE, Hiroshima Univ.³, Faculty of Eng., Kyoto Univ.⁴

Characteristics of edge plasma fluctuations are quite important information to understand the plasma transport in the edge region since the fluctuations can crucially have influences on global plasma confinement properties, as observed in L/H transitions. In Heliotron J, several fast cameras have been used to visualize spatial structures of edge plasma fluctuations and filamentary structures are observed in this region [1]. However, the effects of such structures on the edge transport are not understood well. The purpose of this study is to characterize the filamentary structures and to investigate their effects on the edge plasma transport.

In this study, combination measurement of fast camera and Langmuir probe is carried out. One of the fast cameras installed at #14.5 section looks up vertically from the bottom of the torus and focuses near the opposite side of the last closed flux surface as shown in Fig. 1, where a Langmuir probe can simultaneously measure the plasma parameters.

Figure 2 shows an example of the raw camera image in a plasma discharge heated by ECH. In this discharge, filamentary structures were observed and the structures extracted from the raw image are shown in Fig. 3 by applying band-pass filter in the frequency range from 11 to 16 kHz. This filamentary fluctuation has electromagnetic characteristics because camera and magnetic probe signals are well correlated (~ 0.5 to 0.8) in this frequency range.

Figure 4 shows the phase image difference with a fixed pixel (denoted by “x” in the figure) for fluctuations of 14 kHz, suggesting that the filamentary structures propagate poloidally in the ion diamagnetic drift direction and that the wavelength is roughly 4 cm.

We will discuss the characteristic details of these filamentary structures relating to simultaneously observed Langmuir probe data.

- [1] L. Zang, *et al.*, Plasma and Fusion Res., **8**, 1402066 (2013)

