

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**

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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)

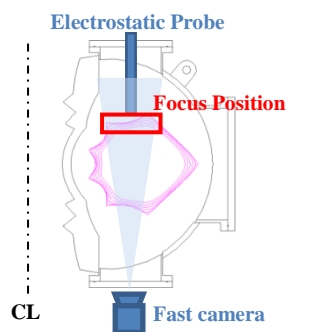


Fig.1 View sight of fast camera

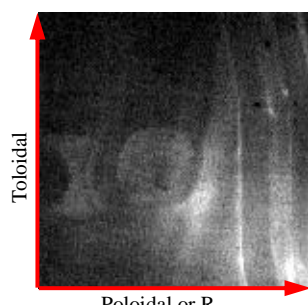


Fig.2 Raw image

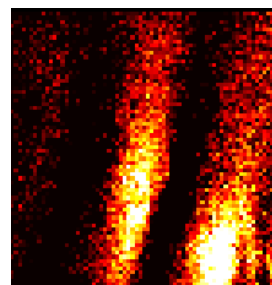


Fig.3 Snapshots
in 11 – 16 kHz region

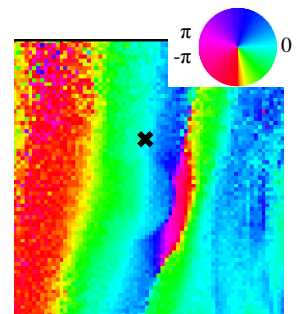


Fig.4 Phase image and
color map