

Measurement of blob-like structures with combining Langmuir probe and fast camera on QUEST

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Extensive experimental data about plasma blobs have gathered by using imaged by fast cameras or Langmuir probe (LP) measurements in the SOL in many devices[1, 2]. But it is difficult to use individual measuring method to study the three-dimension structures and polarization property of blob-like structures at same time. In this paper, a new scheme for combining LP with fast camera was presented for measurement of blob-like structure behavior in the boundary region of ECRF plasmas in QUEST ($R_0=0.64\text{m}$, $a=0.4\text{m}$ and $B\phi=0.25\text{T}$). The k5 fast imaging camera and a new rotatable Langmuir probe system were combined to unveil the spatiotemporal properties of radial blob-like structure behavior in QUEST. The framing rate of camera was typically set at $25 \mu\text{s frame}^{-1}$ with 192×144 pixels each frame for observing angle, radial motion of blob-like structures in the half plasma space which probe head located in. The rotatable probe system used to measure the floating potential, positive bias and ion saturation current with two orthogonal directions in the outboard mid-plane region.

Many bursts in the probe time series are associated with blob-like structures, which are also clearly demonstrated their filamentary structures and radial motion in the edge of QUEST by the fast camera imaging. The time evolution of the visible radiation intensity on probe head by fast camera was calculated and compared with the ion saturation current by LP. When the blob-like structures passed by and touched the probe head, burst in ion saturation current was observed and the visible radiation intensity on probe head by fast camera was also increased at same time. If the blob-like structures passed by but did not touch the probe head, the visible radiation intensity on probe head by fast camera still increased but there was no any burst in ion saturation current, as shown in Fig.1..

[1] Zweben S J et al., 2007 Plasma Phys. Control. Fusion **49** S1

[2] Garcia O E, Naulin V, Nielsen A and Rasmussen J J 2004 Phys. Rev. Lett. **92** 165003

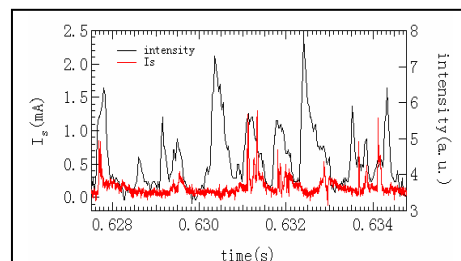


Fig.1. Comparing the ion saturation current by LP (red line) with the visible radiation intensity on probe head by fast camera (black line)