

§33. Dynamic Behaviour of LHD Closed Divertor Plasma on V-shaped Target

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The closed Helical Divertor (HD) in LHD is planned to accomplish an active detached plasma and neutral control to improve plasma confinement and to sustain high performance long pulse operation. The critical issue for realizing long pulse operation is reduction of heat load on the divertor plates with efficient particle control in the divertor plasma. The neutral pressure in the closed HD has to be enhanced by more than one order of magnitude compared to that under the present open divertor condition. Also, the closed HD configuration can contribute to sustaining the super dense core plasma by active pumping of neutral particles in the plasma periphery.

In this study, we have been demonstrated the observation in the detached plasma by changing the geometry of the target plate, that is, oblique target and V-shaped target, on the linear plasma divertor simulator TPD-Sheet IV. Also, we measured ion flux to first-wall in LHD by using bias voltage applied electric probe in the V-shaped target.

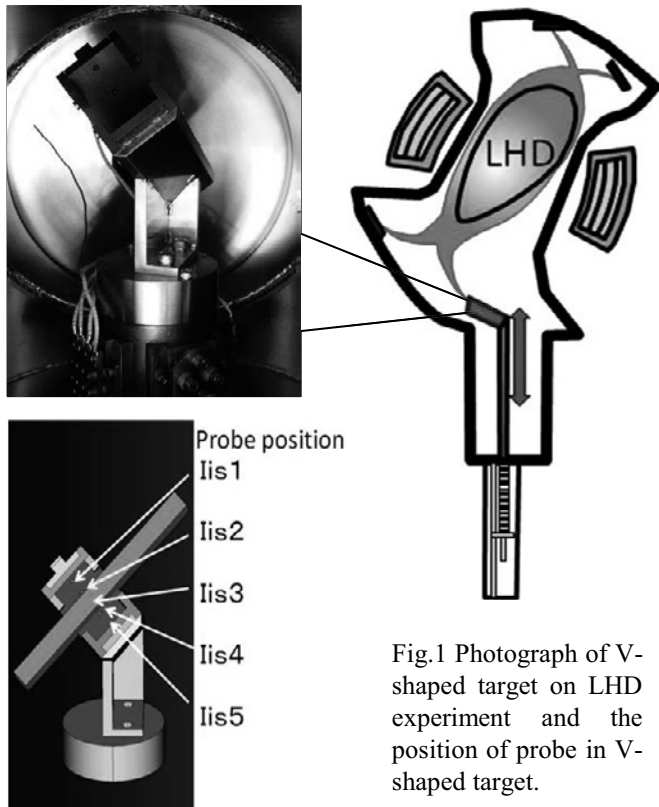


Fig.1 Photograph of V-shaped target on LHD experiment and the position of probe in V-shaped target.

The experiment was performed in the linear plasma device TPD-SheetIV. Electron density and electron temperature were measured using a planar Langmuir probe in front of the endplate.

In LHD experiment, time evolutions of ion saturation current measured by five Langmuir probes in the V-shaped target on divertor plate. The V-shaped target is set up in the movable target device as shown in Fig.1. Fig.2 shows typical time evolutions of ion saturation current measured at V-shaped target in LHD. Typical time evolutions of ion saturation current measured at open-shaped target in LHD is shown in Fig3. In case of the V-shaped target, ion saturation currents of Iis3 and Iis2 are increased with increasing the discharge time. On the other hand, the total ion saturation current in case of the open-shaped target is constant value during the discharge.

It is indicated that the particle recycling occurs in the V-shaped target comparison with the open-shaped target of Helical Divertor in LHD.

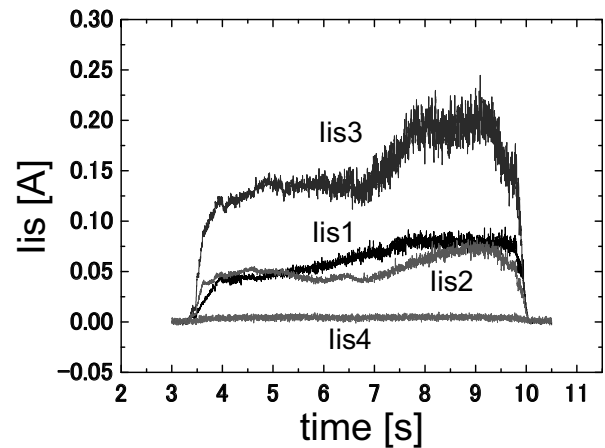


Fig. 2 Typical time evolutions of ion saturation current to V-shaped target on divertor plate in LHD(102099).

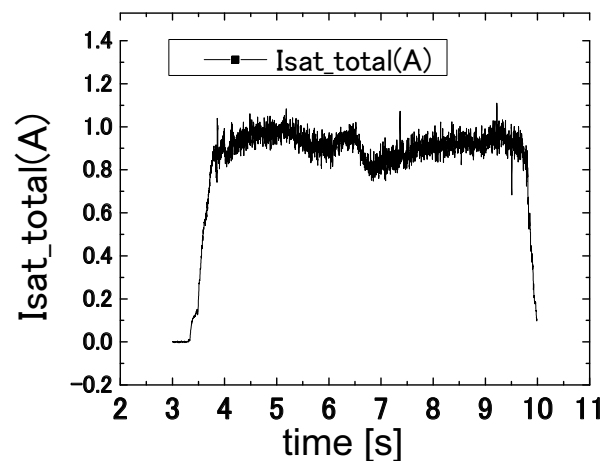


Fig. 3 Typical time evolutions of ion saturation current to open-shaped target on divertor plate in LHD (102099).