

LHDにおける長時間放電プラズマ終端現象のステレオ視高速カメラによる計測

Observation of Termination Processes of Long Pulse Discharges with a Stereoscopic Fast Framing Camera in LHD

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Steady state plasma discharge operation (SSO) is essential for future nuclear fusion reactors. The Large Helical Device (LHD) is the largest super-conducting helical machine in the world. The LHD has advantage over tokamaks for steady-state plasma discharge operation because of no plasma instabilities induced by the toroidal plasma current such as disruptions and ELMs, etc. Thus, long pulse plasma discharges in LHD are a good test-stand for investigating physical phenomena in SSO in nuclear fusion reactors.

In the last experimental campaign in FY2014, a long pulse discharge was terminated with the emission of large amounts of dusts released from the surface of stainless steel armor tiles covering a helical coil can in the inboard side of the torus. The

termination process was successfully observed with a stereoscopic fast framing camera installed in an outer port (3-O). Figure 1 shows the sequential images of the plasma before the termination of the long pulse discharge. It indicates the process of the release of dusts triggered by a small bright spot on a side wall of a helical coil can. The observation shows that the spot expanded with sparks, and it induced the emission of the large amounts of dusts from the armor tiles. It seems that the dusts penetrated into the main plasma confinement region at the 4th image (lower-right one). In order to make it clear, the three-dimensional positions of the observed dusts were derived from these stereoscopic images using a pin-hole camera model, which will be presented in the JSPF meeting.

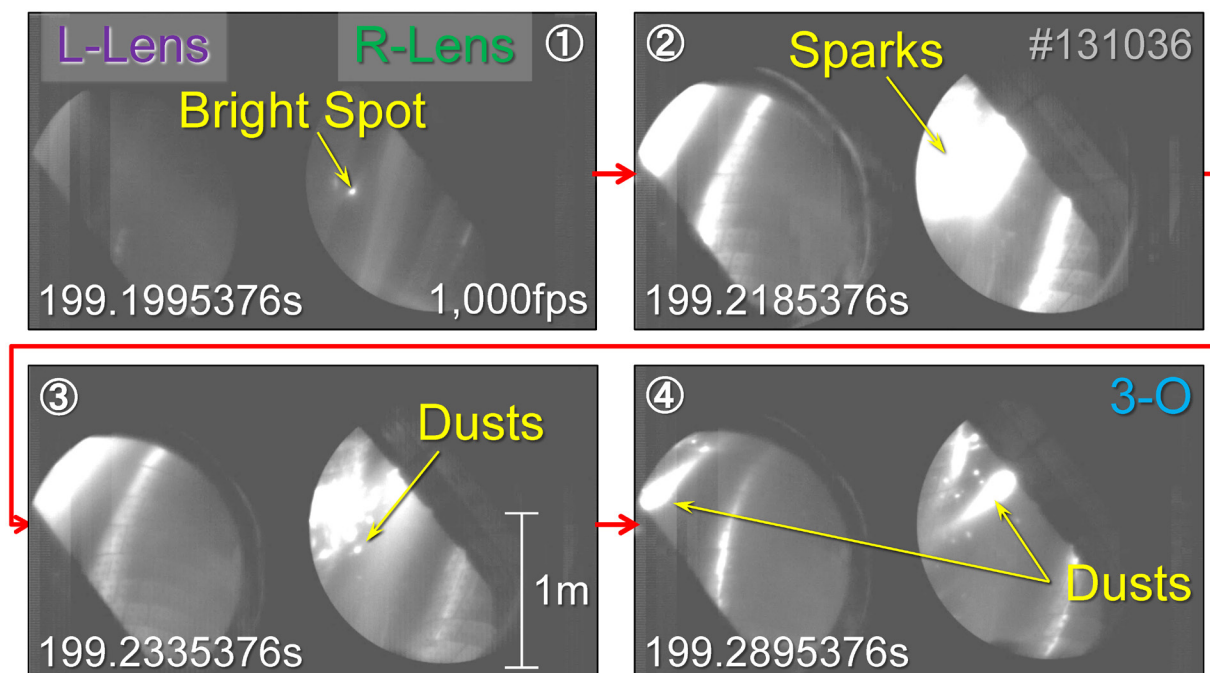


Fig.1 Sequential images of a plasma observed with a stereoscopic fast framing camera just before the termination of a long pulse discharge in the last experimental campaign in FY2014.