

§17. A Study of Peripheral Plasma in Heliotron J by Fast Cameras

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Supersonic molecular beam injection (SMBI) is one of local gas fueling method, and it was quite successful in several machines. In this experimental campaign peripheral turbulence behavior due to SMBI was investigated using a fast camera, Langmuir probe and magnetic probes. Experimental setup is shown in Fig. 1. Two SMBI were installed at the toroidal opposite position (#3.5, #11.5) and a set of movable Langmuir/magnetic probes was installed in one SMBI port (#3.5) to investigate peripheral turbulence. Figure 2 shows typical waveform of SMBI (#3.5) shot and Figure 3 shows the power spectra of magnetic probe data. Before SMBI low frequency turbulence of below 10 kHz was observed near SMBI position, and after SMBI that turbulence of the same frequency range was suppressed. In the SMBI (#11.5) shot the magnetic probe data was similar (not shown in the figure). Therefore, low frequency turbulence was completely suppressed toroidally due to SMBI. Moreover moving the magnetic probe position shot by shot it was found near plasma surface (LCFS) that there was the power spectra peak at 7 kHz, and this peak rapidly decreased with the distance from LCFS. On the other hand fast camera measurement always showed the fine structure turbulence was appeared after SMBI. If peripheral turbulence is magnetic fluctuation, those data would be coincident, and it suggested that turbulence of the low frequency range was suppressed due to SMBI.

Therefore, using SMBI better energy confinement plasma would be handled, and it is very important to resolve the physics of SMBI effect. At the next experimental campaign it should be resolved.

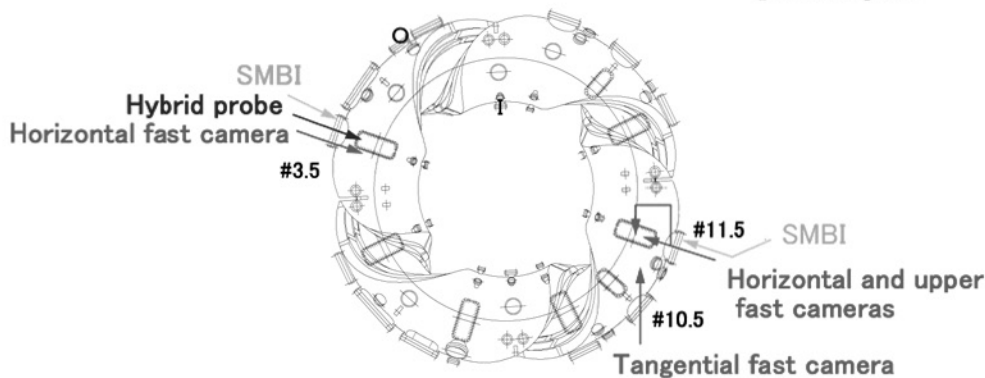


Fig.1 Top view of Heliotron J and the locations of the fast cameras
SA5 used the tangential port, and K-5 used the horizontal and vertical ports. MAX used the horizontal port.

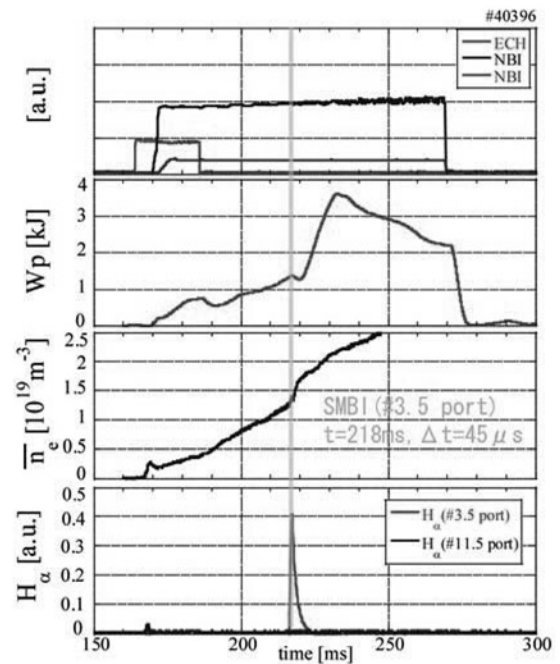


Fig.2 Typical waveform of SMBI#3.5 discharge

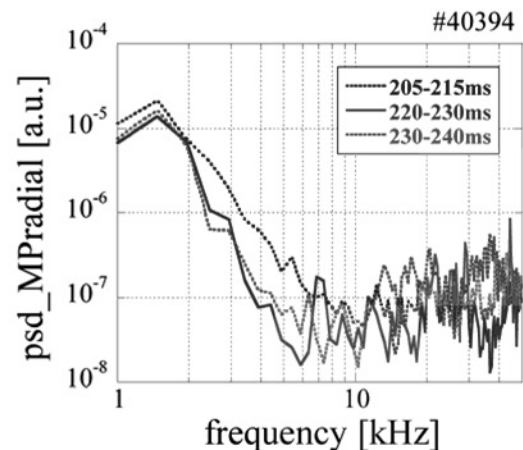


Fig.3 Power spectra of movable magnetic probe signal