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高速カメラによるヘリオトロンJ周辺プラズマ揺動・乱流計測

Edge Turbulence Measurement in Heliotron J by Fast Cameras

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A combination of hybrid probe system, which has several Langmuir probes and magnetic probes, and fast cameras, is installed in the same toroidal section to measure edge turbulence in Heliotron J [1]. It is expected that the electrostatic turbulence and/or electro-magnetic turbulence are distinguished using the magnetic probe data. Also, images by the fast camera reveal spatial feature of filaments, which are typical edge turbulence/fluctuation, and give us information on behavior of filaments in time and space. Spatial potentials and ion saturation currents by Langmuir probes are used to obtain the electron temperature, electron density and electric field in edge region.

ECH (70GHz, 200kW) and NBI (25kV, 700kW) are often used to get good confinement plasmas in Heliotron J. Adding gas puff and/or SMBI [2] during discharge are used to control the plasma density and its spatial profile, also they are very useful to get bright visible light emission for fast camera measurement.

Several results were already obtained by the above measurement system [3, 4].

Harmonic oscillation reported in this conference [5] was observed again, and this oscillation was seemed to be the electro-static fluctuation. During NBI the MHD activity related to TAE was observed in the camera images, ion saturation current, and the magnetic probe data. In particular, the pixel data at the probe position and above probe data seemed to have a good correlation.

These results showed that a combination of the fast camera and hybrid probe system was very useful tool for measuring edge phenomena. It was observed the filaments were rotated in both poloidal directions sometimes [7] in the images. This phenomenon was termed as “dithering” in Heliotron J, and the dithering was usually observed just before H-mode, which is termed as “Phase I” [6]. At this time we also get clear these images at SMBI experiment.

In this conference we would like to report the recent results of edge turbulence measurement in Heliotron J using this system.

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