

ヘリオトロンJにおけるプローブによる最外殻磁気面周辺の揺動構造観測 Observation of fluctuation structure using Langmuir probes around last closed flux surface in Heliotron J

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Turbulence behavior around last closed flux surface (LCFS) is a key issues in plasma fusion researches since plasma performance is substantially influenced by turbulence characteristics around edge region, as observed in transition phenomena to improved confinement modes. In an advanced helical axis heliotron device, Heliotron J, edge fluctuation has been studied using multiple Langmuir probes installed at different toroidal/poloidal sections [1-3].

In low-density ECH plasma discharges with $n_e \sim 0.3 \times 10^{19} \text{ m}^{-3}$, a strong correlation between floating potential signals measured with different probes was observed in the low frequency range less than 10 kHz, as shown in Figure 1. This fluctuation has electrostatic characteristics because correlation with magnetic probe signals was not observed. Radial structure of the fluctuation was investigated by fixing one probe inside LCFS and scanning the other probe around LCFS in radial direction on a shot-to-shot basis. Figure 2 shows radial profiles of coherence and phase difference between floating potential signals of these different probes. Clearly, quite high coherence of ~ 0.95 is observed inside LCFS in the frequency range, and the value quickly decreases outside LCFS. The phase difference is almost zero around the location where high correlation exists. This characteristics are quite similar to those of a phenomenon called long range correlation [4].

In the presentation, details of the characteristics of the low frequency fluctuation around LCFS will be shown and discussed.

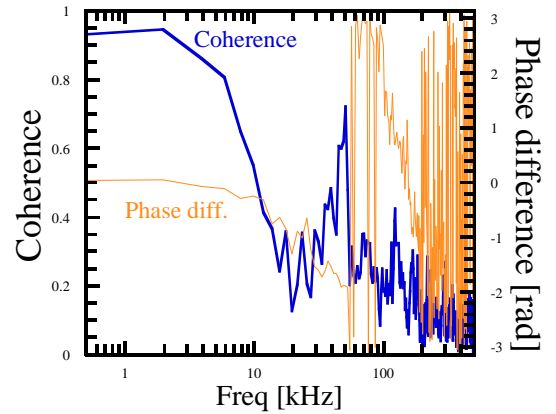


Fig. 1 Coherence and phase difference between floating potential signals measured with toroidally separated probes.

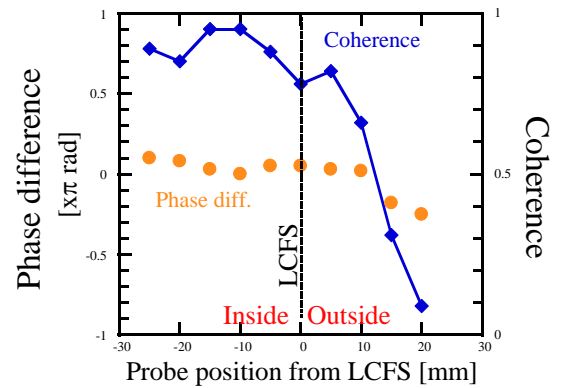


Fig. 2 Radial profile of coherence and phase difference around LCFS between floating potential signals measured with a fixed probe and scanned probe.

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- [4] M. A. Pedrosa et al., Phys. Rev. Lett. **100** 215003(2008)