(MAP) Session Report



May 21, 2024 (C. Suzuki)

Date: May 17, 2024 Time: 10:28 - 15:04Shot#: 191402 - 191488 (87 shots) Prior wall conditioning: None Divertor pump: OFF Gas puff: H₂, He, Ar, N₂ Pellet: W

NBI#(1, 2, 3, 4, 5) = gas(H, H, H, H, H)=P(4.7, 4.2, 4.4, 3.7, -) MW ECH(77GHz) = ant(1.5-Uo, 5.5-U, 2-OUR)=P(-, 0.70, 0.38) MW ECH(154GHz) = ant(2-OLL, 2-OUL, 2-OLR)=P(0.71, 0.89, 0.98) MW ICH(3.5U, 3.5L, 4.5U, 4.5L) = P(-, -, -, -) MW

Topics

- 1. Investigation of turbulence characteristics and nonlinear coupling in turbulence spreading induced by RMP in ECH plasmas (W. Li (SWJTU), M. Kobayashi)
- 2. Exploration of line emissions from tungsten ions in low charge states and the application to the study of impurity transport in the edge plasmas (R. Nishimura(Tohoku U.), I. Murakami)

Motivation and objective: Investigation of turbulence characteristics and nonlinear coupling in turbulence spreading induced by RMP in ECH modulated plasmas.

Experimental conditions: (R_{ax} , Polarity, B_t , γ , B_q) = (3.9 m, CCW, 2.54 T, γ =1.2538, Bq=100 %)

- ◆ RMP is applied to induce edge magnetic island. RMP current is scanned (1.9kA/ 2.5kA/ 3kA)
- The ECH modulation is to induce T_e modulation to excite turbulence. ECH heating power is around 3MW with 19 Hz.
- ◆ The camera was upgraded to newer model, which provides much better S/N than previous one.

Results:

➤ We successfully measured the turbulence characteristics by GPI (He puff@3.5L, 10ms pulse) under different RMP current (see Fig. 1). We find under $\langle n_{e0} \rangle = 1.5 \times 10^{19} m^{-3}$, with increase of RMP current, the RMS value of turbulence fluctuations (t = 3.9 s) decreases.



Fig. 1 The averaged RMS of turbulence fluctuations (t = 3.9 s) decreases along with the increase of RMP current, (a) RMP = 3 kA, (b) RMP = 1.9 kA, (c) RMP = 0 kA.

May. 17, 2024 R. Nishimura, T. Oishi (Tohoku Univ.) Caretaker: I. Murakami

<u>Conditions:</u> $R_{ax} = 3.9 \text{ m}, B_t = 1.375 \text{ T}, \text{CCW}, \gamma = 1.2538, B_q = 100.0 \% \#191459-191487 \text{ (total 29 shots)}$

<u>Objective</u>: Tungsten emission spectra have been observed in LHD from the neutral atoms to the highly-ionized ions up to W^{46+} .

 \Leftrightarrow There has been a lack of observations for low to intermediate charge state range of about W¹⁰⁺–W²⁵⁺.

 \Rightarrow We aim to explore the low to intermediate charge state range by searching line emissions as well as unresolved transition array (UTA). <u>Results:</u>

- For the density range of $n_e = 1, 2, 3, 4 \ge 10^{13}$ cm⁻³ with tungsten injection by TESPEL and impurity pellet, spectroscopic date were obtained in the EUV, VUV, and visible wavelength range.
- Several UTAs appeared in the EUV and VUV range after tungsten injection, and <u>some of them developed as the electron temperature</u> <u>decreased</u> in the latter half of the discharge. Identification of the charge states for the UTAs will be attempted in the future.

