(SG2, TC) Session Report

June 04, 2024 (H. Nakano)

Date: June 04, 2024 Time: 10:30 - 16:45Shot#: 192502 - 192606(shots) Prior wall conditioning: H₂ Divertor pump: On Gas puff: H₂, He, Ar Pellet: TESPEL(Ti)

NBI#(1, 2, 3, 4, 5) = gas(H, H, H, H, H)=P(4.7, 4.1, 4.2, 3.6, 3.0) MW **ECH**(77GHz) = ant(1.5-Uo, 5.5-U, 2-OUR)=P(0.36, 0.70, 0.38) MW **ECH**(154GHz) = ant(2-OLL, 2-OUL, 2-OLR)=P(0.71, 0.81, 0.98) MW **ICH**(3.5U, 3.5L, 4.5U, 4.5L) = P(-, -, -, -) MW

Topics

- 1. Interaction of EGAM, the turbulence and the radial transport (Akihiro Shimizu)
- 2. Turbulence response at both L-H and H-L transition (Tokihiko Tokuzawa)
- 3. Confinement study between dimensionally similar H and He plasmas in LHD (Naoki Tamura)
- 4. Effect of a mixed-ion plasma on impurity transport in NBI heated plasmas (Naoki Tamura)

Interaction of EGAM, the turbulence and the radial transport (A. Shimizu, M. Nishiura, T. Ido(Kyushu Univ.))

Shot #: 192500 - 192529 **Experimental conditions:** (R_{ax} , Polarity, B_{t} , γ , B_{q}) = (3.75 m, CW, 1.375 T, 1.2538, 100 %)

Motivation and objective: To investigate interaction between EGAM and turbulence by HIBP

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Results:

- We tried to measure potential fluctuation of EGAM by HIBP, and to investigate interaction between EGAM oscillation and turbulence.
- ECCD to co-direction was applied to control the rotational transform.
- Fluctuation signal of EGAM was measured by magnetic probe.
- Ion source of HIBP had troubles, so data of HIBP was not be obtained.



Turbulence response at L-H and H-L transitions (T. Tokuzawa)

Experimental conditions: (R_{ax}, Polarity, B_t, γ, B_q) = (3.55 m, CW, 1.0 T, 1.2538, 100.0%) #192530 - #192562

Aim:

 To investigate the response of turbulence during the LH transition. In particular, we aim to observe how different scales of turbulence respond at the same location.

Results:

- The L-H transition was successfully observed in hydrogen gas. (The transition density is slightly higher than that of D-exp).
- DBS (measured k₁ ~ 7.5 cm⁻¹) and BS (measured k ~ 30 Low-k cm⁻¹) were able to observe the respective turbulence at approximately the same location.
- Exactly opposite responses were observed during the LH transition for low and high wavenumbers. Turbulence at low wavenumbers decreased in intensity with the LH transition, while turbulence at high wavenumbers increased.



Confinement study between dimensionally similar H and He plasmas in LHD (N. Tamura et al.)

Experimental conditions: (R_{ax}, Polarity, B_t, γ, B_q) = (3.60 m, CW, 2.75 T, 1.2538, 100.0%) **Shots:** #192563 - #192586 (#192563 - #192565: NBI calib.)

Goal of this experiment

Characterize pure He plasmas with different heating conditions and compare their confinement properties with those in pure H plasmas in LHD
Turing Deputting Le plasma (May 24)

Results

- We produced plasmas heated by ECH and by ECH+H-NBI with a H gas-puff, following the He plasma experiments on May 24
- Plasma profiles (n_e, n_{He}, n_H, T_i, E_r, etc.) and fluctuations obtained will be analyzed
 - Ar gas-puff was performed for the intrinsic impurity transport analysis
 - Li₂TiO₃-TESPELs were injected for the tracer impurity transport analysis
- In H-riched plasmas, the plasma with n_{e_bar} = 4e19 m⁻³ collapsed after the TESPEL injection
 - ✓ Due to impurity accumulation?
 - A clear difference was also observed with the TESPEL between H and He plasmas









Effect of a mixed-ion plasma on impurity transport in NBI heated plasmas (N. Tamura, A. Dinklage et al.)

Black dashed lines show

ref. data (w/o He-puff)

Experimental Configuration: (R_{ax}, Polarity, B_t, γ, B_q) = (3.9 m, CW, 2.5385 T, 1.2538, 100.0%) **Shots:** #192587 – #192606 (#192587: NBI calib.)

Goal of this experiment: To study the change of the impurity accumulation window in H/D/He-mixed plasmas **Results:**

- We tried to change the He contents in the plasma by using different gas puff settings around n_{e_bar} of ~4e19 m⁻³
- When He contents increased, the plasma duration was prolonged, and Bolometer signal level was decreased
 - To study impurity transport, Ar gas was puffed at t = 3.450 s and Ti-TESPEL was injected at t = 4.27 s
 - Ar line emission intensity level, and Ti line emission intensity level will be checked later
- Finally, we obtained a good data set of the D/(H+D) = (0.0, 0.2, 0.5, 0.9) with Rax = 3.9 m
 - ✓ We have also similar data set with Rax = 3.6 m
 - ✓ A detailed comparison between Rax = 3.6 m and Rax = 3.9 m will be done
- Ar He/Li-like profile measured with CXS and Er data will be analyzed later

