(SG2, TC) Session Report

Apr. 11, 2024 (H. Nakano)

Date: April 11, 2024
Time: 12:40 – 14:07
Shot#: 189380 – 189409 (30shots)
Prior wall conditioning: None
Divertor pump: On
Gas puff: H_2, He
Pellet: TESPEL(Ti, Li_2TiO_3), Teflon

NBI#(1, 2, 3, 4, 5) = gas(H, H, H, H, H)=P(4.8, 4.3, 4.2, 3.7, 2.8) MW
ECH(77GHz) = ant(1.5-Uo, 5.5-U, 2-OUR)=P(-, 0.7, 0.4) MW
ECH(154GHz) = ant(2-OLL, 2-OUL, 2-OLR)=P(0.7, 0.9, 1.0) MW
ICH(3.5U, 3.5L, 4.5U, 4.5L) = P(-, -, -, -) MW

Topics

1. Impurity effect on turbulent transport in magnetically-confined toroidal plasmas (Naoki Tamura)

Impurity effect on turbulent transport in magnetically-confined toroidal plasmas (N. Tamura, T. Tokuzawa, M. Goto, K.J. McCarthy, R. Bussiahn, Th. Wegner et al.)

Magnetic configuration: (R_{ax}, Polarity, B_t, γ, B_q) = (3.60 m, CW, 2.750 T, 1.2538, 100.0%)
Shots: #189380 - #189409

Goal of this experiment

- In this study, we systematically investigate how the spatio-temporal structure of electron density fluctuations in high-temperature toroidal plasmas changes with time when impurity ion profiles different from those of background ions and electrons are formed by impurity injection into the high-temperature toroidal plasma

Background & Motivation

- The improvement in confinement caused by introducing impurities is thought to be due to the reduction of turbulent transport triggered by the impurities.
- Still, the intrinsic role of impurities in reducing turbulent transport remains largely unexplained experimentally, although theoretical and simulation studies have pointed out their effects (e.g., impurity mode).

Approach & Methodlogy

- Inject the various impurities into NBI-heated plasmas with the SSGP or TESPEL
  - ✓ He-SSGP: Hollow & narrow impurity (low-Z) profile
  - ✓ Ti-TESPEL: Hollow & narrow impurity (mid-Z) profile
  - ✓ Teflon pellet: Peaked (to be checked) & broad impurtiy (low-Z) profile
  - ✓ Li_2TiO_3-TESPEL: Peaked (to be checked) & broad impurity (mid-Z) profile

Impurity effect on turbulent transport in magnetically-confined toroidal plasmas
(N. Tamura, T. Tokuzawa, M. Goto, K.J. McCarthy, R. Bussiahn, Th. Wegner et al.)

Results

- Various impurities have been injected to (CTR, Balanced) NBI-heated plasmas with the SSGP or TESPEL
- **Different behaviors of fluctuations** measured with PCI **according to the injection type have been measured**
  (Figures shown below have been obtained in CTR-NBI-heated plasmas)
- Other diagnostic data (e.g., DR, BS) will be also analyzed

Reference | **Ti-TESPEL** | **Li_2TiO_3-TESPEL** | **Teflon pellet** | **He-SSGP**