(SG2, TC) Session Report

June 06, 2024 (H. Nakano)

Date: June 06, 2024
Time: 10:30 – 16:45
Shot#: 192731 – 192841 (90 shots)
Prior wall conditioning: He
Divertor pump: On
Gas puff: H_2, Ar, CH_4
Pellet: no

NBI#(1, 2, 3, 4, 5) = gas(H, H, H, H, H)=P(4.5, 4.1, 4.0, 3.3, 4.0) 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, 0.81, 0.98) MW
ICH(3.5U, 3.5L, 4.5U, 4.5L) = P(-, -, -, -) MW

Topics

1. Relation between plasma profile corrugations including transport barrier and magnetic field configurations (M. Sasaki (Nihon Univ.))
2. Electron-scale turbulence on zero gradient (T. Nasu (SOKENDAI))
3. Investigation of the central negative diffusivity during the density modulation (Y. Ohtani (QST))
    - (Piggyback) Effect of a mixed-ion plasma on impurity transport in NBI heated plasmas (D. Damaskopoulos (Univ. Wisconsin-Madison))

Relation between plasma profile corrugations including transport barrier and magnetic field configurations

M.Sasaki, T.Kobayashi, Y.Kawachi, K.Ozawa

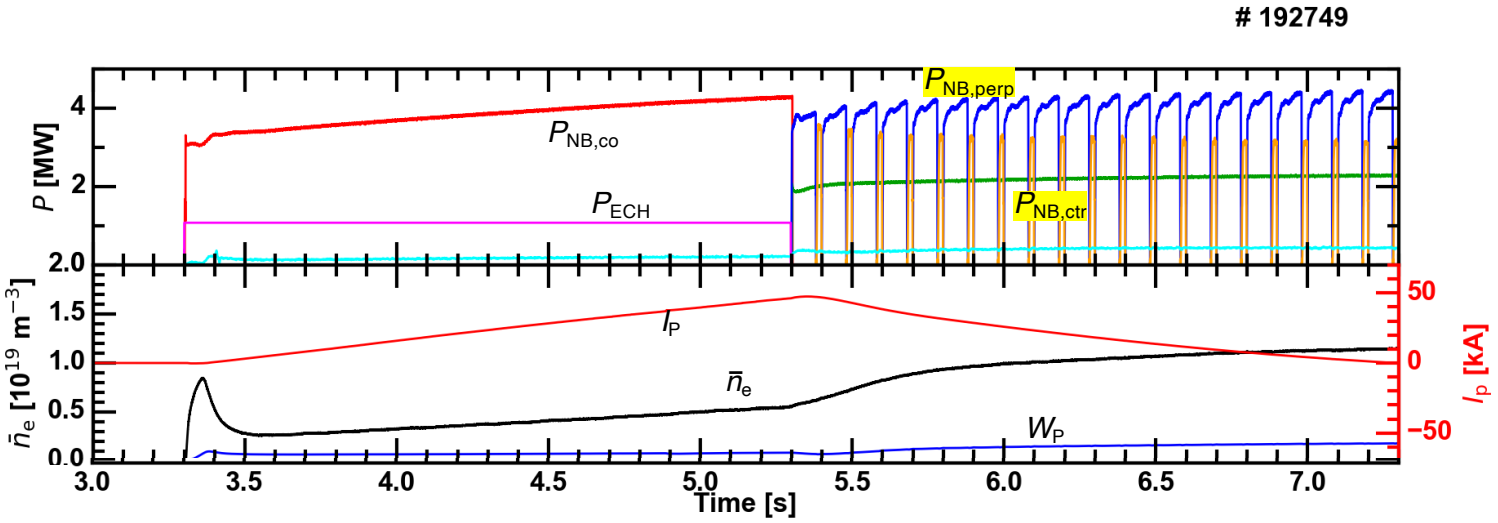
Experimental conditions: (R_{ax}, Polarity, B_t, γ, B_q) = (1.375 T, 3.6 m, 1.2538, 100%)

Goal of this experiment:

- Understanding the relation between the dynamics of plasma profile corrugations including the transport barrier and the rational surface is investigated.

Results:

- Position of the rational surface is controlled by the plasma current induced by NBI and ECH.
- The time scale of the change of iota profile is compared in cases of NBI current drive and NBI + ECCD current drive.
- Turbulence is measured by HIBP, and Back scattering, at rho=0.2~0.7 by the shot-to-shot manner.



Electron-scale turbulence on zero gradient (T. Nasu, T. Tokuzawa, and M. Nakata et al.)

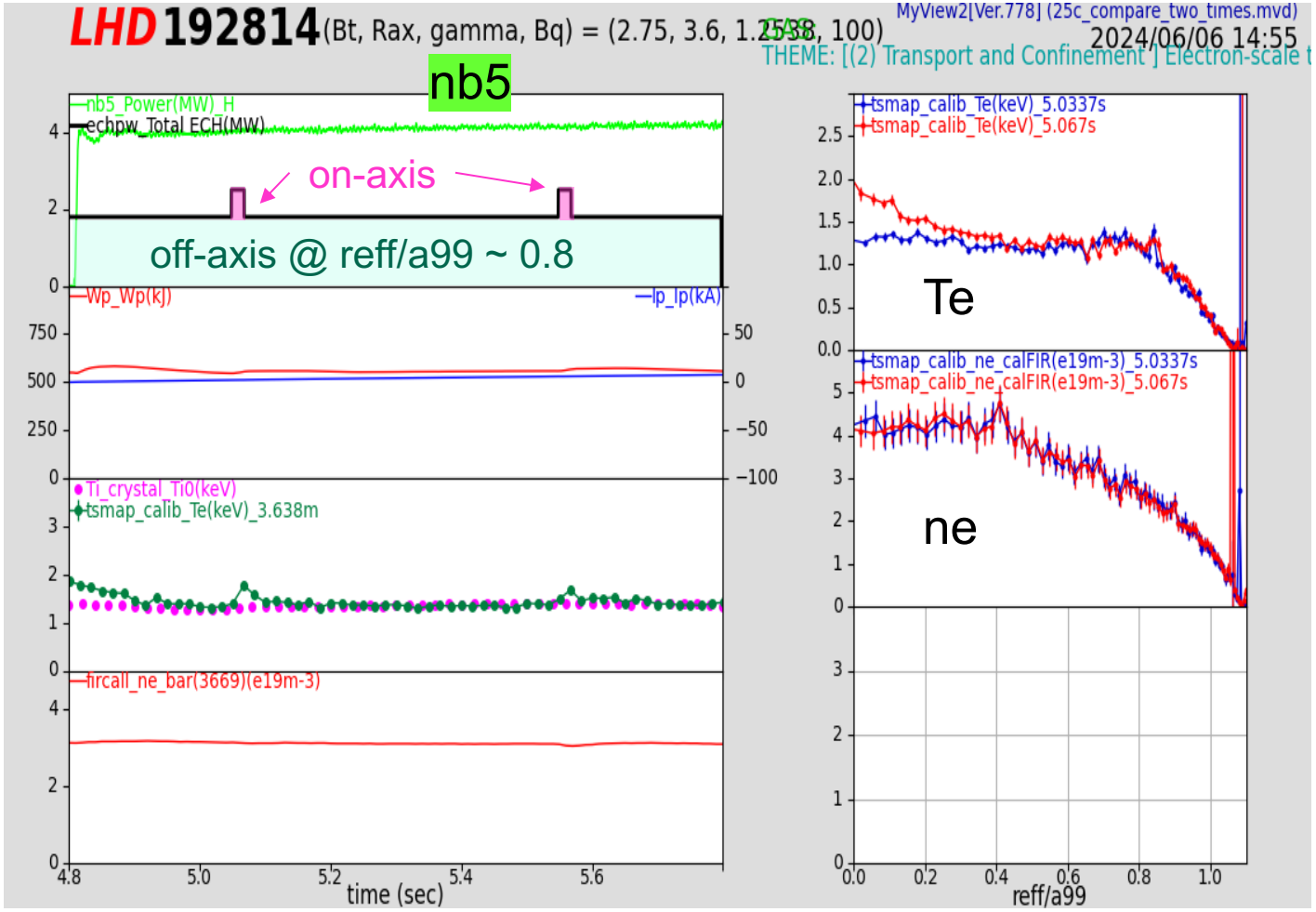
Experimental conditions: (R_{ax}, Polarity, B_t, γ, B_q) = (3.60 m, CW, 2.75 T, 1.2538, 100.0%)

Goal of this experiment:

- Investigating electron-scale turbulence characteristics on flat Te profile, mainly turbulence propagation.

Results:

- The flat Te profiles were attained by combination between perp. NBI and off-axis ECH.
- MECH was used to inject pulse heating to raise center Te.
- center Te was successfully raised locally on flat Te profile without changing Ti and ne.
- BS data observed at reff/a99 ~ 0.1, 0.3, 0.5, 0.7, 1.0 shot by shot.
- BS data will be analyzed to investigate turbulence propagation on flat Te profile.



Investigation of the central negative diffusivity during the density modulation.

Y. Ohtani (QST), K. Tanaka (NIFS), D. Damaskopoulos (WU-Madison)

- Motivation

Understanding particle transport in the core region is one of the important issues for the profile control, the fusion power output. However, during gas modulation, the modulation transported from core to edge is observed. This phenomenon cannot be predicted by the previous method based on Fick's low with positive diffusivity. From this experiment, the relation between this phenomenon and the turbulence and whether this phenomenon is predicted by simulation are investigated.

- Methodology

Density scan (1 - 2.5 x 10^{19} m^{-3}) were performed at Rax = 3.75 m, Bt = 2.64 T with 0.5 Hz density modulation. (#192836 - 42)

- Result

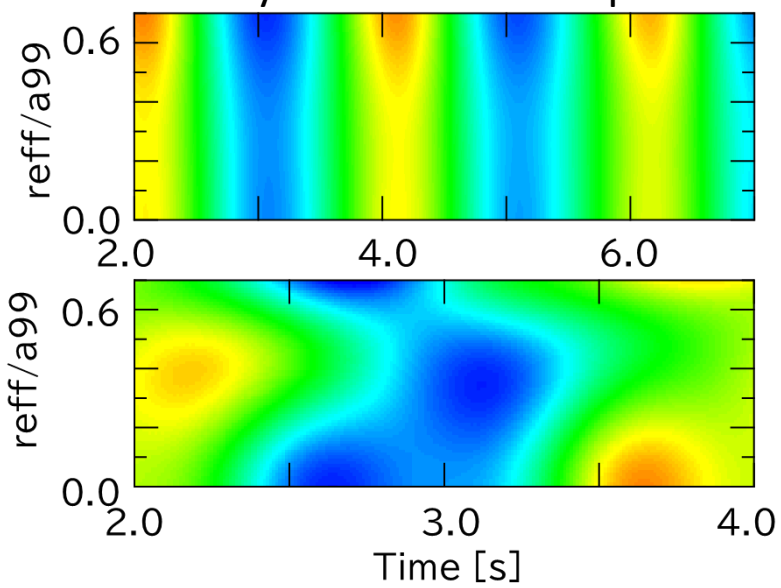
As the previous experiments showed, the phase reversal in the core region is observed in high density case.

Phase reversal is observed in the high density discharge.
(however in low density cases, small phase reversal are observed.)

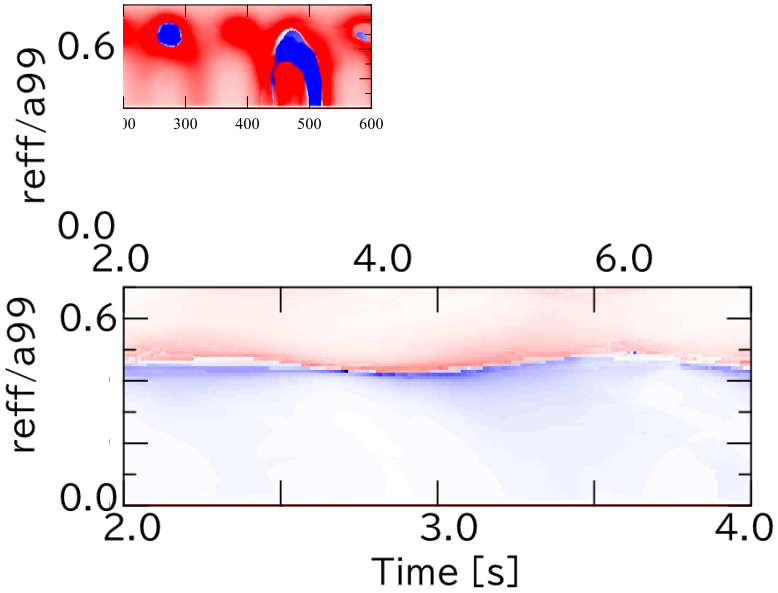
Density modulation component

#192842
n_e=1.5x10^{19} m^{-3}

#192840
n_e=2.5x10^{19} m^{-3}



Blue D_{mod} < 0
Red D_{mod} > 0



In preliminary analysis...
In high density case, D_{mod} in core region is negative.
However, D_{mod} is sometimes negative in low density case.

Comparison with ...
Turbulence
Profiles
and
Simulation