

Dec. 13, 2021 (N. Kenmochi)

Date: Dec. 10, 2021 Time: 13:25 - 18:45 Shot#: 174838 – 174926 (89 shots) Prior wall conditioning: No Divertor pump: On except for 2-I Gas puff: D2, N2, Ne, Ar, Kr, Pellet: No NBI#(1, 2, 3, 4, 5)=gas(D, D, D, D, D)=P(2.2, 1.5, 2.1, 4.5, 4.8)MW ECH(77GHz)=ant(5.5-Uout (or 1.5U), 2-OUR)=P(0.70, 0.79)MW ECH(154GHz)=ant(2-OLL, 2-OUL, 2-OLR)=P(0.98, 0.93, 0.99)MW ECH(56GHz)=ant(1.5U)=P(0)MWICH(3.5U, 3.5L, 4.5U, 4.5L)=P(0, 0, 0, 0)MW Neutron yield integrated over experiment = 6.7×10^{16}

Topics

- 1. Investigation of divertor detachment using superimposed impurity seeding(K. Mukai)
- 2. Investigation of asymmetry of divertor particle and heat fluxes profiles(S. Masuzaki)
- 3. Prediction and maintenance of detached plasma by data-driven approach(H. Yamada(Univ. Tokyo), Y. Isobe(Univ. Tokyo), M. Kobayashi

Divertor detachment using superimposed impurity seeding K. Mukai

Background and objective

- (Original) E_r measurement with HIBP to investigate effect of E_r in superimposed impurity seeding detachment.
- Unfortunately, a trouble occurred in pumping system of HIBP when experimental condition was finding. After that, HIBP could not be used.
- Kr+Ne and Kr+Ar seeding was tried to investigate dependence on impurity species.

Experimental condition

- #174838 ~ #174876 (39 shots)
- (R_{ax} , B_{t} , γ , B_{q})
- = (3.60 m, 2.75 T, 1.254, 100%)
- NBI #1, 2, 3
- $n_{\rm e, \ bar}$ ~ 1 x 10¹⁹ m⁻³
- Divertor pumping: ON

<u>Results</u>

- While plasma response after Ne seeding was comparable, the behavior toward reattachment in Kr+Ne seeding is slower than that in Ne only seeding. (R=
- In Kr+Ar case, plasma response was moderate.
- Relation between these difference and edge *E*_r will be analyzed.



S. Masuzaki

Date of Exp.: 10 December 2021

Shot #: 174877 - 174895 $(R_{ax}, B_t, \gamma, B_q) = (3.6 \text{ m}, \text{CW } 2.75 \text{ T}, 1.2538, 100.0\%)$ P_{NBI} (#1) ~ 2.2 MW P_{NBI} (#4) ~ 4.5 MW (modulated for CXS), P_{NBI} (#5) ~ 4.8 MW ECH ~ 4.2 MW Working gas: D₂ (5.5L, with feedback control)

Motivation:

- Asymmetry in divertor heat and particle loads between divertor tiles located at symmetric positions has been observed.

- To get data necessary for the understanding of the mechanism causing the asymmetry, divertor plasma parameters were measured using Langmuir probe arrays in various heating schemes in different electron densities.

- Electric field in the edge region is a key parameter of the asymmetry.

Results:

- Heating patterns were the same as the CCW experiment on 9 Dec.
- The asymmetry inversed with the Bt direction.
- Electric field data measured by CXS were obtained.

- Different responses to the modulated NB4 between L and R arrays were observed.



Radial profiles and time evolutions of Er

Prediction and maintenance of detached plasma by data-driven approach (Y.Isobe, H.Yamada (UTokyo), M.Kobayashi et al.)

Background and objective

- To aim at quantitative clarification of the boundary condition between attachment and detachment by datadriven approach and then to provide hints to exploration of underlying physics of plasma detachment.
- Fulfilling data with small RMP and low B
- Paying attention to the effect of RMP and the response of plasma with regard to the role of magnetic island.

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Experimental Condition

- \blacksquare R_{ax} =3.9m, B=2.54/1.36T, I_{UD} =214–3000A
- Seek for transition boundary with surveying RMP amplitude and ramping up density

Results

- Dataset has been extended.
- See typical discharges with detachment.

Scope

- Revision of analysis based on extended dataset
- Investigation of magnetic island by saddle loop

