

(TG3) Spectroscopy Topical Group Report



Oct. 25, 2022 (M. Yoshinuma)

Date: Oct. 24, 2022

Time: 15:00-18:45

Shot#: 181308 – 181374 (67 shots)

Prior wall conditioning: D2 glow

Divertor pump: ON (w/o 2I)

Gas puff: H, D, N, Ne, He

Pellet: -

NBI#(1, 2, 3, 4, 5)=gas(H, H, H, H, H)=P(--, --, 3.2(No injection), 3.7, 4.7)MW

ECH(77GHz)=ant(5.5-Uout (and 1.5U), 2-OUR)=P(703, 792)kW

ECH(154GHz)=ant(2-OLL, 2-OUL, 2-OLR)=P(723, 799, 825)kW

ECH(56GHz)=ant(1.5U)=P(-)kW

ICH(3.5U, 3.5L, 4.5U, 4.5L)=P(-)MW

Neutron yield integrated over the experiment = 5.4×10^{12}

Topics

1. Te locking to magnetic island with impurity seeding (M.Kobayashi)

Te locking to magnetic island with impurity seeding (M. Kobayashi et al.)

Background and objective

Experiments in tokamaks and helical devices show that the edge magnetic topology (X-point, island) plays a crucial role on a stability of edge radiation layer. Despite the recently increasing experimental observations, the mechanism of the stabilization is not yet fully understood. The present experiment investigates spatial structure of the thermal condensation instability (MARFE) observed at the edge island, in order to analyze transport during the MARFE formation.

Experimental condition

$R_{ax}=3.90$ m, 2.54T, $\gamma=1.254$, Bq=100%, CCW, H plasmas, ECH ~ 2 MW. Neon was puffed at 4.0 sec (5.5L, 5V), and amount was scanned. The island phase was changed for 6-O, 7-O, 1-O and 2-O expansion.

Results

- Figure shows radial profiles of Te & ne at the edge magnetic island with Ne seeding (13 ms pulse) for different island phases at $t = 4.767$ sec.
- Radiation at 3-O bolometer shows different time traces for different island phase: Toroidal asymmetry?
- 6-O island** shows clear MARFE formation at the outboard side (blue symbols), and **1-O island** shows similar but modest MARFE feature at the inboard side (black symbols). No clear density condensation is observed with **7-O** and **2-O** islands.
- The results clearly show that the MARFE does not occur in the entire island region but is localized. The spatial structure will be analyzed together with spectroscopic data.

