(TG2) Turbulence Topical Group Report

Dec. 20, 2022 (M. Nishiura)

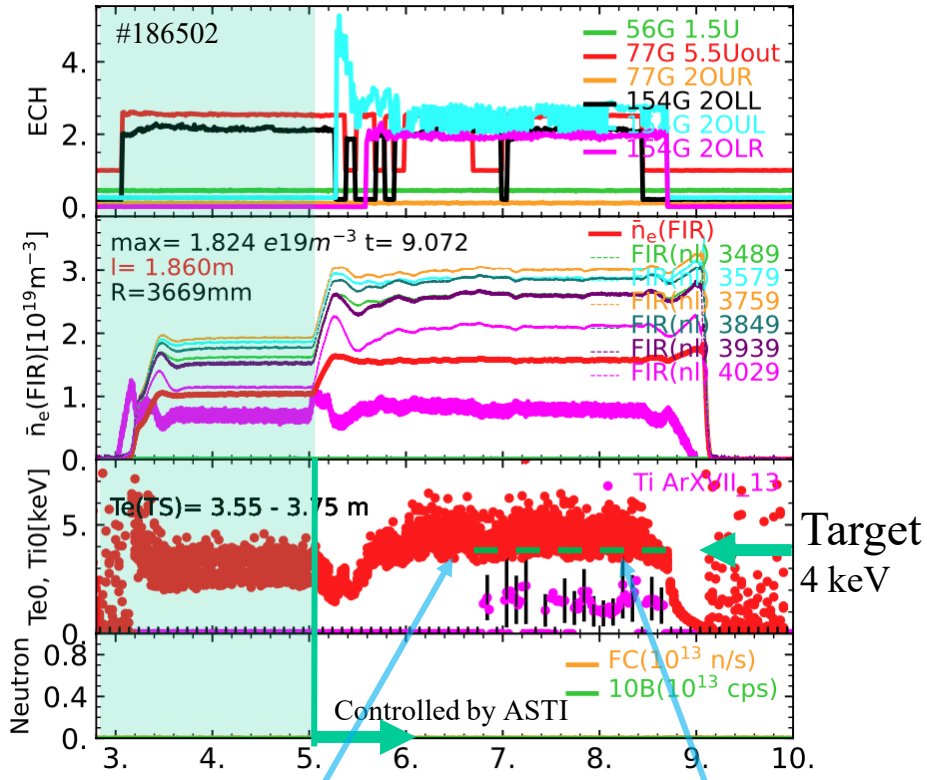
Date: Dec. 19, 2022
Time: 16:00-18:45
Shot#: 186452-186502
Prior wall conditioning: no
Divertor pump: ON
Gas puff: H2, Ar
Pellet: -
NBI#(1, 2, 3, 4, 5)=gas(H, H, H, H, H)=P(-, -, -, -, -)MW
ECH(77GHz)=ant(5.5-Uout (or 1.5U), 2-OUR)=P(0.330, -)MW
ECH(154GHz)=ant(2-OLL, 2-OUL, 2-OLR)=P(0.398, 0.601, 0.602)MW
ECH(56GHz)=ant(1.5U)=P(-)MW
ICH(3.5U, 3.5L, 4.5U, 4.5L)=P(-, -, -, -)MW
Neutron yield integrated over the experiment = 1.9×10^{13}

Topics

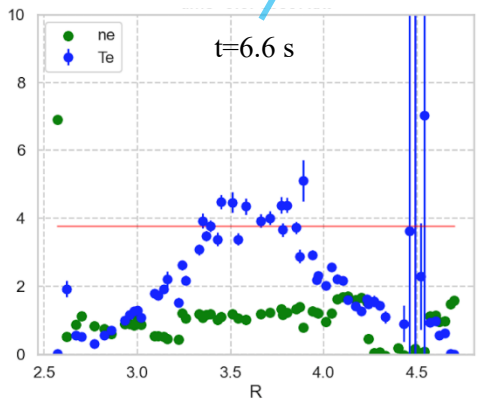
1. Demonstration of real-time ECH plasma control by the data assimilation system ASTI (S. Murakami, Y. Morishita, N. Kenmochi)

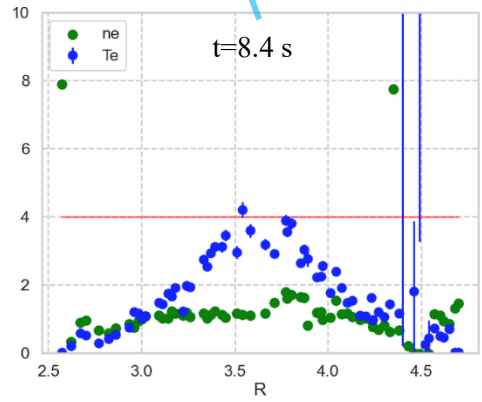

186475
3.6e+11

Demonstration of real-time ECH plasma control by the data assimilation system ASTI (S. Murakami, Y. Morishita, N. Kenmochi)



Predetermined heating
Optimization of the
prediction model (TASK3D)





Shot #: 186452 - 186502

Experimental conditions:

(R_{ax}, Polarity, B_t, γ, B_q) = (3.6 m, CCW, -2.75 T, 1.254, 100 %)

Motivation and objective:

To demonstrate the real-time ECH control by the data assimilation system ASTI.

Results:

- ASTI assimilated the electron density and temperature obtained by the real-time Thomson scattering and estimated the ECH power to produce a target state.
- We have conducted experiments to control the electron temperature at the plasma center starting at 5 s, reaching the target temperature at 7 s, and sustaining the temperature from there.
- In these experiments, before starting control, the system model (TASK3D) was optimized during the interval 3-5s to prevent control instability in the early stages.
- We successfully produced the target states (Te0=3-5 keV) varying ne0=0.75 – $2.0 \times 10^{19} m^{-3}$.
- We have also tried to control the density by adjusting the voltage of gas puff. However, this control has not yet worked.
- We will improve the gas puff model for the experiment on Dec. 27 and try to conduct a more complicated control of temperature and gas puff again for 40s discharges.