(TG4) Plasma instability group report

Nov. 12, 2021 (Y. Takemura)

Date: Nov. 11, 2021
Time: 15:30 - 18:45
Shot#: 172413 – 172472 (60 shots)

Prior wall conditioning: None
Divertor pump: On
Gas puff: D2, Pellet: No
NBI#(1, 2, 3, 4, 5)=gas(H, D, D, D, D)=P(0.0, 2.2, 2.2, 0.0, 0.0)MW
ECH(77GHz)=ant(5.5-U, 2-OUR)=P(0.70, 0.79)MW
ECH(154GHz)=ant(2-OLL, 2-OUL, 2O-LR)=P(0.98, 0.93, 0.99)MW
Neutron yield integrated over experiment = 1.6×10^{16}

Topics

1. Real-time control to avoid radiative collapse (T. Yokoyama, UT)

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Experimental conditions: (R_{ax}, Polarity, B_t, γ, B_q) = (3.6 m, CCW, 2.75 T, 1.2538, 100.0%)

Background and motivation:

- Control and avoidance of radiative collapse is necessary to achieve stable high-density plasma.
- Control system based on result of data-driven approach was applied to D plasma.
- For detailed discussion on the mechanism of collapse, fast Thomson scattering (FTS) will be useful.

Results:

- Collapse in ramp-up phase was avoided by turning gas puff on/off and injecting boost ECH.
- Density did not develop as high as experiment in H plasma conducted in the previous cycle.
- Off-axis injection of ECH was used to improve effectivity of plasma heating in edge region.
  - No big difference was observed between on-axis and off-axis injection in collapse avoidance using boost ECH and gas puff control.
  - In both cases, collapse was not avoided using only ECH.
- Triggering FTS by control system did not work well.