Scenario development toward high beta steady-state operation at KSTAR


1, National Fusion Research Institute, KSTAR TEAM — Solving issues for high-beta long-pulse operation is one of the essential topics for superconducting tokamaks and sustainment of a fully non-inductive H-mode discharge with high performance is successfully demonstrated up to record-long ~70 seconds at KSTAR. Typical plasma parameters are 0.4MA(I_p), max 5MW (NBI+ECH), \( \beta_p \approx 3 \), \( f_{BS} \approx 0.5 \), \( H_{98} \approx 1.3 \) and in a wide range of \( q_{95} = 6 \sim 12 \). Though an internal transport barrier is not identified yet, the developed scenario has many features in common with the so called high \( \beta_p \) discharge at DIII-D. The thermal confinement is sensitive on the deposition layer of the central ECH heating ~1MW and it correlates with MHD activities in the range of TAE frequency (100~200kHz) suggesting strong interaction TAE with fast ion transport. Based on the transport/stability analysis on the present discharge, improved performance is also estimated with higher NBI+ECH heating power envisaged in near future.

1Ulsan National Institute of Science and Technology

S. W. Yoon
National Fusion Research Institute

Date submitted: 24 Aug 2017
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