Progress of joint experiment on EAST/DIII-D

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The experiments by a joint team of researchers from the DIII-D and EAST tokamaks to demonstrate a fully non-inductive scenario that could be extended on EAST as long pulse steady-state tokamak operation has been carried out. Fully non-inductive plasmas with extremely high values of the poloidal beta have been sustained with excellent energy confinement quality and internal transport barriers generated at large minor radius (≥0.6) in all channels (T_e, T_i, n_e, V) on DIII-D. Newly experiments have shown that the key feature of large radius ITB, which results in excellent stability and energy confinement characteristics, is maintained when the scenario is extended inductively to higher plasma current, for lower q_{95}, and more balanced neutral beam injection, for lower plasma rotation on DIII-D.

Meanwhile，experiments have started to adapt on EAST the fully-noninductive high poloidal beta scenario developed on DIII-D to demonstrate steady state tokamak operation at high performance on metal walls. As a start, the electron density was varied to vary the deposition profile of the external lower hybrid current drive (LHCD), while keeping the plasma in fully-noninductive conditions to achieve a broad current profile that could enable improved core confinement.

In addition, the joint EAST/DIII-D experiments in the RF-heated H-mode scheme with comparison to that of NB-heated H-mode were performed on DIII-D and EAST under similar conditions to examine the SOL width characteristics for extrapolation to ITER. It has been demonstrated on both DIII-D and EAST that RF-heated plasma has a broader SOL than NB plasma when the edge electrons are effectively heated in low-density regime with low toroidal rotation and low collisionality.