Abstract Submitted
for the DPP01 Meeting of
The American Physical Society

Sorting Category: 5.6.2 (Experimental/Observational)

Progress in MHD Stability and Current Drive Towards Steady-State High Performance[1] T.S. TAYLOR, DIII-D TEAM, General Atomics — The DIII-D steady-state high performance scenario requires an elevated axial q with weak or negative central shear, which is favorable to local stability, high bootstrap fraction, and reduced transport. Two key research elements of this scenario are MHD stability at high b and off-axis current drive. Good progress has been made on stabilization of resistive wall modes (RWM) and neoclassical tearing modes (NTM), the main obstacles to sustaining high β. Identification of the error field amplification of a marginally stable RWM as the mechanism for the loss of rotation in high β plasmas has led to stabilization of the RWM by plasma rotation and an increase in β_N to approximately twice the free-boundary limit. In separate discharges, NTMs have been stabilized by feedback-localized electron cyclotron current drive (ECCD), and β was increased 20% above the NTMonset value. The efficiency of off-axis ECCD, which at low β suffers a reduction due to trapping effects, was found to increase with increasing β_e and recover near axial values at $\beta_e = 2\%$, as predicted by theory. Scenario modeling indicates the planned 3.5 MW of ECCD plus existing neutral beam heating can sustain these high bootstrap fraction, high performance scenarios.

[1]Work supported by the US DOE under Contract DE-AC03-99ER54463.

T.S. Taylor
taylor@fusion.gat.com
General Atomics

☐ Prefer Oral Session
☒ Prefer Poster Session

Special instructions: Poster 1, Stability, MHD, Current Drive, Advanced Tokamak

Date submitted: July 20, 2001 Electronic form version 1.4