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Progress in Advanced Tokamak Development in DIII-D¹ C.M. GREENFIELD, AND THE ADVANCED TOKAMAK THRUST GROUP, DIII-D National Tokamak Facility — Advanced Tokamak (AT) research in DIII-D focuses on developing a scientific basis for steady-state, high performance operating regimes. The high performance goal motivates active MHD stabilization, pressure profile control and plasma shape optimization to reach high β . Resistive wall mode suppression via externally applied magnetic fields has become routine in DIII-D. Density (and pressure) profile broadening via electron cyclotron heating (ECH) was recently demonstrated in Quiescent Double Barrier (QDB) plasmas. The steady-state goal motivates replacement of the Ohmic current with bootstrap and electron cyclotron current drive (ECCD). Bootstrap optimization makes control of the pressure profile even more important. High power (>2 MW) ECCD was applied for the first time to DIII-D AT (QDB and High Bootstrap) plasmas. In each case, over 100 kA was driven, consistent with integrated modeling that indicates we have produced a target plasma capable of attaining steady-state with 3.5 MW of ECCD. Flexibility of the DIII-D plasma control system for AT integration was demonstrated by real-time control of the electron temperature profile both with neutral beams and ECH.

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☒ Prefer Oral Session
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C.M. Greenfield
greenfiel@fusion.gat.com
General Atomics

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