Abstract Submitted
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Control of Neoclassical Tearing Modes in DIII-D[1] A.S. WELANDER, R.J. LAHAYE, B.G. PENAFLOR, J. LOHR, V. NORAKY, R. PRATER, N.W. EIDIETIS, D.A. HUMPHREYS, General Atomics, E. KOLEMEN, PPPL, F. TURCO, Columbia University — New techniques have been developed on DIII-D for control of neoclassical tearing modes (NTMs). The NTM is a helical magnetic island formation that can occur on flux surfaces where the safety factor, q is a rational number. An NTM can be suppressed by depositing electron cyclotron current drive (ECCD) on the q-surface by injecting microwave beams into the plasma. On DIII-D, steerable mirrors that reflect these beams into the plasma can be adjusted when the q-surface is moving to keep the ECCD aligned. Accurate tracking is made possible by equilibrium reconstructions that include measurements of the motional Stark effect and by estimating beam refraction. Three different algorithms can be employed to fine-tune alignment when NTMs occur. The first method adjusts ECCD alignment in steps until the island shrinks. The second method sweeps the alignment to find where ECCD has the biggest effect on the NTM. The third method uses temperature measurements by electron cyclotron emission. The gyrotrons are pulsed and the position of the resulting temperature pulses is compared to the position where the rotating NTM causes temperature fluctuations. Recent experimental results and directions toward robust disruption-free control will be presented.

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