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Theory Experiment

Neoclassical Tearing Mode Control With Modulated Electron Cyclotron Current Drive in DIII-D,* A.S. Welander, *General Atomics*, and DIII-D NTM Control for ITER Thrust Team – The neoclassical tearing mode (NTM) is a helical island structure in the magnetic field of a high beta tokamak plasma that can degrade confinement and lead to disruption. The DIII-D control system has suppressed the NTM by driving continuous-wave (cw) current at the island using electron cyclotron current drive (ECCD). This requires accurate alignment of the ECCD deposition with the rational q-surface of the island. Methods have been developed to achieve and maintain good alignment. Modulation of ECCD with the island has not previously been attempted since cw ECCD is effective when the deposition region is narrow. However, in ITER the region will be relatively wide. The control system has been recently upgraded to modulate the ECCD so that current is driven only when the island passes by the deposition point. The intent is to test effectiveness of modulated ECCD with a wide deposition region. Key issues are real-time identification of island phase and commands of gyrotron pulses. Validation of the upgraded system and possibly experimental data will be presented.

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