

**Abstract Submitted for the Forty-Ninth Annual Meeting  
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Category Number and Subject:

Theory     Experiment

**Locked Neoclassical Tearing Mode Control on DIII-D by  
Electron Cyclotron Current Drive and Magnetic Perturbations,\***

F. Volpe, *ORAU*, R.J. La Haye, R. Prater, E.J. Strait, *General Atomics* – Magnetic perturbations were used at DIII-D to unlock, reposition or spin locked tearing modes and so assist their electron cyclotron current drive (ECCD) stabilization. While the island was slowly (0.66 Hz) dragged in the toroidal direction and illuminated by 1.3 MW ECCD, current was alternatively driven in its O-point and X-point. Correspondingly, a modulation of the mode amplitude by up to a factor 2 was observed, consistent with the stabilizing/destabilizing effect of ECCD in the O/X point. Faster sustained rotation, at up to 180 Hz, was also demonstrated. This brings the locked mode case into the well-studied rotating neoclassical tearing mode (NTM) case. It also opens up the possibility to synchronize and phase-lock the ECCD modulation to the entrained mode rotation, which is simpler than adapting the ECCD to the natural mode frequency and phase.

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