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Theory Experiment

High Speed Scanning of the ECH RF beams on DIII-D,*
J. Lohr, M. Cengher, Y.A. Gorelov, S. Noraky, D. Ponce, A.S. Welander, *General Atomics*; R.A. Ellis, E. Kolemen, *PPPL* – The ECH launchers on the DIII-D tokamak have been modified for rapid poloidal sweeping of the rf beams using high speed dc motors and magnetic position encoders. This enables the system to perform such tasks as responding to the need to suppress growing tearing modes on different flux surfaces, modifying sawtooth oscillations and altering the current density profile. The mechanical capability is backed by real time motional Stark effect EFIT equilibrium calculations, magnetic spectra analysis by NEWSPEC, fast ray tracing using TORBEAM (checked by TORAY) and real time n_e and T_e profiles from Thomson scattering. The poloidal scan can cover the full 40° range across the plasma upper half plane in about 100 ms and provide position accuracy for the rf deposition of approximately 2 mm at the plasma center for a beam with 10 cm diameter at the -10 dB contour. The entire capability is orchestrated from the Plasma Control System, which can also modulate the gyrotron outputs as required.

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