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Theory Experiment

Extension of Gyrotron Pulse Length on the DIII-D ECH System,* I.A. Gorelov, J. Lohr, D. Ponce, M. Cengher, *General Atomics* – There are six 110 GHz gyrotrons in operation on the DIII-D ECH system. All of these tubes have been designed for 10 s pulses at 1 MW, 80 kV and 40 A. The gyrotrons are routinely operated on DIII-D for up to 5 s pulse duration, consistent with physics requirements for the typical DIII-D discharge duration of ~6 s. Following collector failures in the first production run of three gyrotrons, it was found that the collectors were developing leaks due to cyclic fatigue. Improved sweeping of the electron beam along the collector and modest restriction on gyrotron operating space have resolved the collector issue, and thermal model calculations have been verified by collector temperature measurements. Future DIII-D program plans call for 10 s discharge durations to validate the physics basis for stationary discharges significantly exceeding the current redistribution time in support of ITER. These physics requirements will require full design pulse lengths from the gyrotrons, therefore we are planning to increase the pulse duration of the gyrotrons on DIII-D to 10 s. Technical considerations and model calculations associated with the longer pulse lengths will be presented.

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