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Category Number and Subject: 6.20 DIII-D Tokamak

Theory Experiment

Upgrades and Additions for the ECH System on DIII-D,*
Y.A. Gorelov, J. Lohr, M. Cengher, D. Ponce, *General Atomics* – Six MW-class, 110 GHz gyrotrons have been in routine operation on DIII-D since 2008. One of these gyrotrons, which had low rf production and higher than normal collector power loading, failed due to a collector water leak. Nevertheless, the number of 110 GHz gyrotrons remained the same, as the first new 110 GHz CPI gyrotron with depressed collector potential design was installed and used in the 2013 experimental campaign. The DIII-D ECH transmission line system now comprises seven evacuated transmission lines up to 80 meters in length with transmission efficiencies from 69%–79% and four dual launchers. New stands are being fabricated and installed for two additional depressed collector gyrotrons, one with designed power of 1.2 MW at 110 GHz and the other with 1.5 MW at 117.5 GHz. One gyrotron was relocated to accommodate the new additions. High voltage power supplies, the water-cooling system and new waveguide lines for these gyrotrons are being built. One of the 110 GHz 1.0 MW gyrotrons in DIII-D was used as a source for heat exchanger tests. The rf beam was routed to a mobile test unit (MTU) trailer and shows expected expansion of beam radius vs distance from the waveguide end. Experiments were completed using 50–500 kW injected into the MTU lab at pulse lengths from 5–300 ms.

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