

Abstract Submitted
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Analysis, Installation, and Testing of the DIII-D High Power Helicon Antenna¹ MICHAEL BROOKMAN, General Atomics - San Diego, DIII-D TEAM — A 1 MW, 476 MHz Helicon fast wave electron current drive antenna system has been installed at the DIII-D facility. Antenna modules, transmission structures, sources and instrumentation have been tested, tuned, installed in the vessel, and evaluated. Optimization and tuning have produced antenna characteristics of 2% reflection from the 30-module array and an average vacuum loss of 1.3% per module. Plasma coupling experiments at low power suggest these characteristics are sufficient to drive a substantial current with a sustainable thermal load. Evaluation under power is planned during the 2020 DIII-D campaign. Infrared camera and thermocouple measurements during plasma operations with an unpowered antenna are consistent with expectations from plasma modeling. Modules for real time thermal load estimation and collision avoidance have been integrated into the DIII-D PCS to insure safe operation of the antenna. A 10-kW transmitter has been used to evaluate performance of some antenna hardware under thermally significant powers and at experimentally relevant fields. Antenna optimization, low power studies, and multiphysics simulations provide confidence that the Helicon antenna is ready for operations.

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