Abstract Submitted
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Measurements of helicon antenna coupling in DIII-D[1] R.I. PINSKER, C.P. MOELLER, J.S. DEGRASSIE, C.C. PETTY, J.P. ANDERSON, H. TORREBLANCA, GA, M. PORKOLAB, MIT, C. LAU, ORNL, J.G. WATKINS, SNL, L. ZENG, UCLA — In preparation for 1-MW-level helicon wave experiments, good coupling efficiency of a low-power 12-element phased-array antenna at 476 MHz has been found in several plasma regimes in the DIII-D tokamak. The antenna, a traveling-wave structure of the 'comb-line' type, is designed to excite helicons (fast waves in the LHRF) at a nominal $n_{||}$ of 3. This structure is a low-power prototype (operating at up to 0.4 kW) of a 30-element structure intended for operation at the 1 MW level, which is in the design stage. The dependence of wave coupling on the antenna/plasma distance was found to fit well with a simple model with one adjustable parameter in stationary regimes. In ELMing H-mode discharges that are calculated to have complete first-pass absorption of the coupled waves, strong coupling is found even between ELMs, which supports the design of the high-power antenna. To facilitate quantitative modeling, SOL density profiles were measured with a profile reflectometer, and the density adjacent to the antenna was measured with a fixed Langmuir probe. Future experiments using the high-power antenna will permit measurement of the non-inductive current drive efficiency using helicon waves in high-beta discharges.

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