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Modeling of helicon antenna in DIII-D using the VSim $code^{1}$ A.Y. PANKIN, D.N. SMITHE, Tech-X Corp, M.W. BROOKMAN, B. VAN COM-PERNOLLE, A.M. GAROFALO, General Atomics, E.H. MARTIN, ORNL, R.I. PINSKER, General Atomics, C.M. ROARK, Tech-X Corp — The helicon antenna recently installed in the DIII-D tokamak can become a valuable current drive actuator in future experiments. According to previous modeling results [R. Prater et al. NF 54 (2014) 083024, the propagation of helicon waves in the plasma core is sensitive to different parameters. In this study, we report the results of the helicon waves propagation computed with VSim [C. Nieter, J.R. Cary, JCP 196 (2004) 448] both for the prototype and final helicon antenna designs. Analytical fits to the plasma profiles from the DIII-D shot 165908 are used in these simulations. Several scans with the pedestal density gradient and outer gap for a simplified antenna geometry are conducted. It is demonstrated that the penetration of fast wave in the plasma core is reduced when the outer gap is increased. In a scan with the poloidal field, an offset between the magnetic field and the antenna polarization is introduced which is equivalent to the introduction of a poloidal field in the SOL to cause the polarization mismatch. A small level of mode competition with the slow wave propagating in SOL before encountering a lower-hybrid resonance near the pedestal base is observed. Development of a surface wave that carries energy along the plasma-wall interface is demonstrated.

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