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Numerical modeling of helicon wave coupling optimization and possible parasitic excitation of slow waves in KSTAR EUN-HWA KIM, MASAYUKI ONO, NICOLA BERTELLI, PPPL, SYUNICHI SHIRAIWA, MIT, SONJONG WANG, NFRI, Korea, HYEON PARK, UNIST, Korea — Helicon waves are being considered for plasma heating and current drive in KSTAR. While slow mode has a low cutoff density and can propagate from the antenna to the higher magnetic field/density region, helicon waves can have an evanescent layer between the antenna and the edge plasma. Therefore, both helicon and slow waves should be considered in the modeling of the KSTAR helicon experiment. We first perform wave simulations by adopting a time-dependent 1D fluid wave code to examine helicon and slow wave excitation from the antenna and subsequent propagation to the plasma core for various values of angle between normal antenna current and static magnetic field. We then examine 2D simulations of fast and slow waves using Petra-M (Physics equation translator for MFEM) developed by the RF SciDAC center (Center for Integrated Simulation of Fusion Relevant RF Actuators), which is an open source finite element analysis platform. The optimized plasma conditions for helicon wave coupling to the plasma core in KSTAR is also discussed.

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