Abstract Submitted
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3D HHFW full wave simulations for NSTX-U with realistic antenna geometry and SOL plasma[1] NICOLA BERTELLI, S. SHIRAIWA, G.J. KRAMER, PPPL, C. LAU, ORNL, E.-H. KIM, M. ONO, PPPL, RF SCIDAC TEAM — 3D full wave simulations of HHFW that include the scrape-off layer (SOL) and realistic antenna geometry are presented for NSTX-U. NSTX-U will operate with toroidal magnetic fields up to 1 T, up to 10 MW of neutral beam injection (NBI) and up to 6 MW of HHFW for heating and current drive. We focus on the HHFW propagation in NSTX-U for different antenna conditions, plasma scenarios, and edge plasma parameters. In order to perform all of this, we employ the Petra-M code, which is a newly developed state-of-the-art generic electromagnetic simulation tool for modeling RF wave propagation based on MFEM, open source scalable C++ finite element method library. Scans of the antenna phasing and toroidal magnetic field strength are presented to investigate the interaction of the fast waves with the SOL plasma and the core fast wave propagation. The impact of different SOL electron density profiles on the HHFW antenna loading is investigated and an evaluation of induced current on the antenna box is presented. First results are shown from a coupling of the 3D RF solver with the full-orbit following particle code SPIRAL and its impact of the 3D wave fields on the fast ion population from NBI beams in NSTX-U.

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