

Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Recent progress in development of full torus size RF simulation on NSTX-U¹ S SHIRAIWA, N BERTELLI, M ONO, PPPL, C LAU, ORNL, M SHEPHARD, RPI, RF SCIDAC TEAM — High harmonic fast wave (HHFW) presents a unique challenge for the RF full wave simulation. These waves are excited using a geometrically complicated strap type antenna located close to the plasma surface. Unlike the regular fast waves, the number of straps tends to be large (12 at NSTX-U) for better wave directivity. Moreover, the relative size of wave length to the plasma is smaller and the wave field solution contains many wave oscillations. Resolving such a wave field is expensive especially for the 3D full wave simulations. We tackled this issue using a high order finite element basis. We use the Petra-M versatile FEM analysis platform and modeled HHFW propagation in the entire NSTX-U plasma with fully detailed 12 strap antenna included. The simulation results are compared with TORIC, AORSA, and 2D simulations on Petra-M, showing good agreement. In this talk we also report recent development in Petra-M platform. Potential advantages of high order finite element basis when taking the warm plasma effects into account is also discussed.

¹Work supported by US DoE contract numbers DE-SC0018090, DE-SC0018319, DE-SC0018275, FWP 3ERAT952, FWP 2017-LLNL-SCW1619, and DE-AC02-CH0911466.

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Date submitted: 29 Jun 2020

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