Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Extending fullwave core ICRF simulation to SOL and antenna regions using FEM solver[1] S. SHIRAIWA, J. C. WRIGHT, PSFC, MIT — A full wave simulation approach to solve a driven RF waves problem including hot core, SOL plasmas and possibly antenna is presented. This approach allows for exploiting advantages of two different way of representing wave field, namely treating spatially dispersive hot conductivity in a spectral solver and handling complicated geometry in SOL/antenna region using an unstructured mesh. Here, we compute a mode set in each region with the RF electric field excitation on the connecting boundary between core and edge regions. A mode corresponding to antenna excitation is also computed. By requiring the continuity of tangential RF electric and magnetic fields, the solution is obtained as unique superposition of these modes. In this work, TORIC core spectral solver is modified to allow for mode excitation, and the edge region of diverted Alcator C-Mod plasma is modeled using COMSOL FEM package. The reconstructed RF field is similar in the core region to TORIC stand-alone simulation. However, it contains higher poloidal modes near the edge and captures a wave bounced and propagating in the poloidal direction near the vacuum-plasma boundary. These features could play an important role when the single power pass absorption is modest. This new capability will enable antenna coupling calculations with a realistic load plasma, including collisional damping in realistic SOL plasma and other loss mechanisms such as RF sheath rectification.

[1]USDoE awards DE-FC02-99ER54512, DE-FC02-01ER54648

Syun'ichi Shiraiwa
PSFC, MIT

Date submitted: 15 Jul 2016 Electronic form version 1.4