Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Iterative Addition of Kinetic Effects to Cold Plasma RF Wave Solvers[1] DAVID GREEN, Oak Ridge National Laboratory, LEE BERRY, XCEL Engineering, RF-SCIDAC COLLABORATION — The hot nature of fusion plasmas requires a wave vector dependent conductivity tensor for accurate calculation of wave heating and current drive. Traditional methods for calculating the linear, kinetic full-wave plasma response rely on a spectral method such that the wave vector dependent conductivity fits naturally within the numerical method. These methods have seen much success for application to the well-confined core plasma of tokamaks. However, quantitative prediction of high power RF antenna designs for fusion applications has meant a requirement of resolving the geometric details of the antenna and other plasma facing surfaces for which the Fourier spectral method is ill-suited. An approach to enabling the addition of kinetic effects to the more versatile finite-difference and finite-element cold-plasma full-wave solvers was presented by [1] where an operator-split iterative method was outlined. Here we expand on this approach, examine convergence and present a simplified kinetic current estimator for rapidly updating the right-hand side of the wave equation with kinetic corrections. [1] D. L. Green, L. A., Comp. Phys. Comm. 185(3), 736-743 (2014)

[1]This research used resources of the Oak Ridge Leadership Computing Facility at the Oak Ridge National Laboratory, which is supported by the Office of Science of the U.S. Department of Energy under Contract No. DE-AC05-00OR22725

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Date submitted: 14 Jul 2017 Electronic form version 1.4