Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

GPU enabled kinetic effects in radio-frequency heating simulation[1] DAVID GREEN, Oak Ridge National Lab, RF-SCIDAC COLLABORATION — In previous work we have demonstrated [1] the iterative addition of parallel kinetic effects to finite-difference frequency-domain simulation of radio-frequency (RF) wave propagation in fusion relevant plasmas. Such iterative addition in configuration space bypasses several of the difficulties with traditional spectral methods for kinetic RF simulation when applied to problems that exhibit non-periodic geometries. Furthermore, the direct numerical integration of particle trajectories in real magnetic field geometries removes violations of the stationary phase approximation inherent in the spectral approach [2]. Here we extend this method to include perpendicular kinetics by relying on the massively parallel capability of GPUs to enable resolution of 3 velocity-space dimensions. We present results for a mode converted ion Bernstein wave scenario in 1-space plus 3-velocity dimensions case relevant to fusion plasmas.

[1] D. L. Green and L. A. Berry, Comp. Phys. Comm., 185(3), pg. 736-743 (2014); doi:10.1016/j.cpc.2013.10.032
[2] D. L. Green and L. A. Berry, http://meetings.aps.org/link/BAPS.2013.DPP.BP8.70

[1]This research used resources of the OLCF at ORNL, which is supported by the Office of Science of the U.S. Department of Energy under Contract No. DE-AC05-00OR22725.

David Green
Oak Ridge National Lab

Date submitted: 23 Jul 2015 Electronic form version 1.4