Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Fokker-Planck transport modelling of RF-heated magnetic mirrors with Hybrid-Particle-in-Cell code[1] ATUL KUMAR, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA, LEOPOLDO CARBAJAL, Instituto de Ciencias Nucleares, UNAM, Mexico City 04510, Mexico , J.F. CANESES MARIN, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA — In the past few years, there has been an increased interest in Radiofrequency (RF) heating of low ($\sim 10eV$) and high ($\sim 1keV$) temperature plasmas in open magnetic geometries for applications ranging from diverter simulators, electric thrusters, fusion neutron sources, fusion-fission hybrids and pure-fusion reactors. This has motivated the development for Fokker-Planck solvers to understand transport under the influence of RF heating, Coulomb collisions and kinetic effects.
In this work, we present progress towards Fokker-Planck transport simulations of RF heated plasmas in open magnetic geometries using a parallel, electromagnetic, hybrid-Particle-in-Cell code: Prometheus++ where the electrons are of fluid nature and the kinetic behavior of ions is retained. Furthermore, a Fokker-Planck Coulomb collision operator has been developed and added to the code to investigate the collisional transport of ions in these devices. In addition, we discuss the process of selecting initial conditions for both the plasma pressure and beta-corrected magnetic field in order to minimize the free energy at the start of simulation. Finally, we discuss plans to introduce RF heating operators.

[1]This work was supported by the US. D.O.E. contract DE-AC05-00OR22725 and sponsored by the Laboratory Directed Research and Development Program of Oak Ridge National Laboratory, managed by UT-Battelle, LLC, for the U. S. Department of Energy.

Atul Kumar
Oak Ridge National Laboratory

Date submitted: 29 Jun 2020 Electronic form version 1.4