Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Toroidal Electromagnetic Particle-in-Cell Code with Gyro-kinetic Electron and Fully-kinetic ion[1] JINGBO LIN, Department of Modern Physics, University of Science and Technology of China, WENLU ZHANG, Center for Plasma Theory and Computation, Institute of Physics, Chinese Academy of Sciences, PENGFEI LIU, Department of Modern Physics, University of Science and Technology of China, DING LI, Center for Plasma Theory and Computation, Institute of Physics, Chinese Academy of Sciences — A kinetic simulation model has been developed using gyro-kinetic electron and fully-kinetic ion by removing fast gyro motion of electrons using the Lie-transform perturbation theory. A particle-in-cell kinetic code is developed based on this model in general magnetic flux coordinate systems, which is particularly suitable for simulations of toroidally confined plasma. Single particle motion and field solver are successfully verified respectively. Integrated electrostatic benchmark, for example the lower-hybrid wave (LHW) and ion Bernstein wave (IBW), shows a good agreement with theoretical results. Preliminary electromagnetic benchmark of fast wave at lower hybrid frequency range is also presented. This code can be a first-principal tool to investigate high frequency nonlinear phenomenon, such as parametric decay instability, during lower-hybrid current drive (LHCD) and ion cyclotron radio frequency heating (ICRF) with complex geometry effect included.

[1]Supported by National Special Research Program of China For ITER and National Natural Science Foundation of China.

Jingbo Lin
Department of Modern Physics, University of Science and Technology of China

Date submitted: 15 Jul 2016 Electronic form version 1.4