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Toroidal Particle-in-Cell Code with Gyro-kinetic Election and Fully-kinetic ion JINGBO LIN, PENGFEI LIU, Department of Modern Physics, University of Science and Technology of China, WENLU ZHANG, Institute of Physics, Chinese Academy of Science, ZHIHONG LIN, Department of Physics and Astronomy, University of California, Irvine — Current drive and auxiliary heating is critical for fusion plasmas. 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 magnetically confined fusion. Single particle motion and field solver are successfully verified respectively. Preliminary integral benchmark, for example the lower-hybrid wave (LHW) and ion Bernstein wave (IBW), shows a good agreement with theoretical results. This code could be used to investigate high frequency nonlinear phenomenon during lower-hybrid current drive (LHCD) and ion cyclotron radio frequency heating (ICRF).

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