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Particle simulation of radio frequency waves in fusion plasmas ANIMESH KULEY, University of California Irvine, BAO JIAN, Peking University, ZHIHONG LIN, University of California Irvine — Radio frequency (RF) waves can provide heating, current and flow drive, as well as instability control, and others nonlinear phenomenon for steady state operations of fusion experiments. A RF particle simulation has been developed in this work to provide a first-principles tool for studying the RF nonlinear interactions with plasmas. In this model, ions are considered as fully kinetic particles using the Vlasov equation and electrons are treated as guiding centers using the drift kinetic equation. This model has been implemented in a global gyrokinetic toroidal code GTC with realistic toroidal geometry using real electron-to-ion mass ratio. Linear simulations of ion plasma oscillation, ion Bernstein wave, and lower hybrid wave have been verified. Also we verified the propagation of the lower hybrid wave in cylindrical and toroidal geometry and its Landau damping by electron. Our goal is to develop a nonlinear toroidal particle code to study the radio frequency wave heating and current drive in fusion plasmas.

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