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Fully kinetic particle simulation of radio frequency waves in toroidal geometry ANIMESH KULEY, JIAN BAO, ZHIHONG LIN, University of California Irvine — 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 electron-to-ion mass ratio in cylindrical geometry and verified the linear physics of ion plasma oscillation, ion Bernstein wave, lower hybrid wave and its propagation in cylindrical and toroidal geometry. Recently we have verified the linear mode conversion of slow and fast waves in cylindrical geometry. Also we have extended the cyclotron integrator in Boozer coordinates to capture the ion Bernstein, and ion cyclotron modes in toroidal geometry. 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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