Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Particle simulations in a global toroidal geometry[1] ANIMESH KULEY, SADHITRO DE, TAJINDER SINGH, Indian Institute of Science, ZHIHONG LIN, University of Califronia Irvine, SARVESHWAR SHARMA, ABHIJIT SEN, Institute for Plasma Research, Gandhinagar, India — The gyrokinetic toroidal code (GTC) has been upgraded for global simulations by coupling the core and scrape-off layer (SOL) regions across the separatrix with field-aligned particle-grid interpolations. A fully kinetic particle pusher for high frequency waves (ion cyclotron frequency and beyond) and a guiding center pusher for low frequency waves have been implemented using cylindrical coordinates in a global toroidal geometry. The two integrators correctly capture the particle orbits and agree well with each other, conserving energy and canonical angular momentum. As a verification and application of this new capability, ion guiding center simulations have been carried out to study ion orbit losses at the edge of the DIII-D tokamak for single null magnetic separatrix discharges. The ion loss conditions are examined as a function of the pitch angle for cases without and with a radial electric field. Finally, as a further verification of the capability of the new code, self-consistent simulations of zonal flows in the core region of the DIII-D tokamak were carried out.

[1]DAE, SERB

Animesh Kuley
Indian Institute of Science

Date submitted: 03 Jul 2019 Electronic form version 1.4