Abstract Submitted
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A new Lagrangian particle scheme utilizing phase space grid for XGC1 edge gyrokinetic code[1] SEUNG HOE KU, Princeton Plasma Phys Laboratory, R. HAGER, C.S. CHANG, Princeton Plasma Phys Lab, S. PARKER, University of Colorado, Boulder, THE EPSI TEAM — A new Lagrangian numerical scheme has been developed that utilizes the phase space grid in addition to the usual marker particles. The new scheme splits the probability distribution function (PDF) of a kinetic equation into PDF of weighted particles and PDF of phase space grid. The former contains the fast varying part of the whole PDF and the later mostly contains the slowly varying part. The numerical scheme is implemented in the gyrokinetic particle code XGC1, which specializes in simulating the tokamak edge plasma. Since edge plasma across the magnetic separatrix and in contact with the wall is in non-thermal equilibrium with sources and sinks, the conventional delta-f technique is inapplicable. Deviation of the slowly varying PDF on velocity grid can be arbitrarily large. The weights of marker particles are determined by "direct weight evolution" instead of the differential form of weight evolution equations that conventional delta-f schemes use. Particle weight is slowly transferred to the phase space grid, suppressing the growth of particle weights. Comparison with the usual full-f and delta-f method confirms validity of the new scheme. The new scheme is compatible with massively parallel computing.

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Seung Hoe Ku
Princeton Plasma Phys Lab

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