Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

**A new method for computing the gyrocenter orbit in the tokamak configuration** YINGFENG XU, University of Science and Technology of China — Gyrokinetic theory is an important tool for studying the long-time behavior of magnetized plasmas in Tokamaks. The gyrocenter trajectory determined by the gyrocenter equations of motion can be computed by using a special kind of the Lie-transform perturbation method. The corresponding Lie-transform called I-transform makes that the transformed equations of motion have the same form as the unperturbed ones. The gyrocenter trajectory in short time is divided into two parts. One is along the unperturbed orbit. The other one, which is related to perturbation, is determined by the I-transform generating vector. The numerical gyrocenter orbit code based on this new method has been developed in the tokamak configuration and benchmarked with the other orbit code in some simple cases. Furthermore, it is clearly demonstrated that this new method for computing gyrocenter orbit is equivalent to the gyrocenter Hamilton equations of motion up to the second order in timestep. The new method can be applied to the gyrokinetic simulation. The gyrocenter orbit of the unperturbed part determined by the equilibrium fields can be computed previously in the gyrokinetic simulation, and the corresponding time consumption is neglectable.

Yinfeng Xu
University of Science and Technology of China

Date submitted: 11 Aug 2013 Electronic form version 1.4