Self-consistent gyrokinetic Vlasov-Maxwell system for nonlinear processes in plasmas

PENGFEI LIU, Univ of Sci Tech of China, WENLU ZHANG, CHAO DONG, Institute of Physics, CAS, JINGBO LIN, Univ of Sci Tech of China, ZHIHONG LIN, University of California, Irvine — A self-consistent gyrokinetic Vlasov-Maxwell system which is capable of studying phenomena related to ponderomotive force is developed with long wavelength approximation and background Maxwellian distribution in the presence of electromagnetic fluctuations. According to the ordering analysis, the introduction of quadratic Hamiltonian would raise the order of the Vlasov-Maxwell system. Therefore, guiding-center transformation is proceeded up to the order of $\epsilon_B^2$, and gyrocenter transformation is proceeded up to the order of $\epsilon^2$. And higher order terms of the first order gyrocenter Hamiltonian $\bar{H}_1$ and gauge field $S_1$ are brought back. In this way, effects are also presented which are resulted from the inhomogeneities of equilibrium profile but the curvature of equilibrium magnetic field on the moments of distribution.

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