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Non-Maxwellian ion distribution function in edge pedestal SEUNGHOE KU[1], Courant Institute of Mathematical Sciences, New York University, SEHOON KOH, Korea Advanced Institute of Science and Technology, C.S. CHANG[2], Courant Institute of Mathematical Sciences, New York University —
Gradient scale length of plasma density and temperature in the edge pedestal can be comparable to the banana orbit width of thermal ions. In the present-day large size tokamaks and future fusion reactors including ITER, the ion orbits in the H-mode pedestal can execute a significant radial excursion before experiencing Coulomb collision. Under such circumstances, a local thermal equilibrium may not be possible for ions. When Coulomb collisions are negligible, the ion distribution function becomes a canonical distribution function. In the large collisionality limit, the ion distribution function approaches a local Maxwellian. We use the XGC (X-point included Guiding Center[1]) code to study the property of ion distribution function in a quiescent pedestal plasma with steep density and temperature gradients. Deviation of the ion distribution function from a local Maxwellian or canonical Maxwellian distribution functions are studied as function of collision frequencies. It is shown that the non-Maxwellian property of the ion distribution function is greatly influenced by the orbit squeezing and expansion from radial electric field shear. [1] C.S. Chang, S. Ku, et al, Phys. Plasmas 11, 2649 (2004)

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