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Gyrokinetic Formalism in Plasmas with Flows[1] S.C. CHIU, Sunrise R&M, V.S. CHAN, Y.R. LIN-LIU, M.S. CHU, General Atomics — There is considerable theoretical and experimental evidence that plasma rotations in tokamaks can improve stability and confinement. Understanding the physics of rotating tokamak plasmas is thus of great importance for attaining high performance in reactors. Since present and future tokamaks are likely to have auxiliary heating such as radio frequency (RF) waves or neutral beam injection, it is of interest to understand the interaction of auxiliary heating with plasma rotation, and its consequences to transport and stability. In the past, rotation has not been self-consistently treated in auxiliary heating in that it is either ignored or ambipolarity is not self-consistently maintained. In this work, we describe a gyrokinetic formalism for RF in rotating plasmas which takes ambipolarity and equilibrium into account. A non-canonical guiding center Lagrangian for rotating plasma in a fluctuating field is obtained, and from which the gyrokinetic equation is deduced. Limiting the wave equations to the cyclotron frequency or below, quasilinear equations using an eikonal approximation are derived. Conservation laws for the system shall be discussed.

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