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Revisiting Gyro-Kinetics as a Transport Theory, I of II G. G. PLUNK, ERIC WANG, STEVE COWLEY, UCLA — A derivation of the nonlinear Gyro-kinetic equation using Method of Multiple Scales is presented. Results are obtained for slab and toroidal field geometries. This approach assumes three disparate frequency scales: the ion cyclotron frequency, turbulent frequency, and transport rate. Also assumed are two important spatial scales: the ion larmor radius (ρ_i) and plasma size ($L \sim n/|\nabla n|$). The fundamental expansion parameter is $\epsilon = \rho_i/L$. The Fokker-Planck equation is expanded in orders of ϵ , up to the Gyro-kinetic equation. Finally, a physical interpretation of Gyro-kinetic equation is given.

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