Extended gyrokinetic field theory for time-dependent magnetic confinement fields[1] HIDEO SUGAMA, TOMOHIKO WATANABE, MASANORI NUNAMI, National Institute for Fusion Science — In conventional gyrokinetic theories, the gyrocenter phase-space variables are defined by using the background magnetic confinement field that is assumed to be independent of time. Recently, several studies have been trying to perform long-time gyrokinetic turbulent transport simulations up to the transport time scale although they still use the above-mentioned assumption. However, the background or equilibrium magnetic field changes along with the pressure profile on the transport time scale. Therefore, in order to accurately describe the long-time behaviors of the gyrokinetic turbulence, we need to treat the time-dependent background field and show how to determine its time dependence. In this work, the gyrokinetic field theory [1] is extended to derive the condition which determines the time-dependent magnetic confinement fields in axisymmetric toroidal systems. Then, conservation laws of energy and momentum including the part of the time-dependent background fields are naturally derived from the extended gyrokinetic field theory.

[1] H. Sugama, Phys. Plasmas **7**, 405 (2000).

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