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A novel mechanism for driving spontaneous rotation[1] P.I. CHICHIKOV, P.S. NEUVAZHAY-KORYTO, C.J. MCDEVITT, P.H. DIAMOND, U.C.S.D. — Beginning from a phase space conserving gyrokinetic formulation, a systematic derivation of parallel momentum conservation uncovers two physically distinct mechanisms in which microturbulence may drive spontaneous rotation. The first mechanism, which emanates from ExB convection of parallel momentum, has already been analyzed in [1,2], and was shown to be contingent upon radial electric field shear. Thus, this mechanism is most likely to be active in regions with steep pressure gradients. The second mechanism uncovered, which appears in the gyrokinetic formulation through the parallel nonlinearity, emerges due to charge separation induced by the polarization drift. This novel means of driving spontaneous rotation, while higher order in ω_k/ω_{ci}, is not dependent on radial electric field shear. Thus, while the magnitude of the former mechanism is strongly diminished in regions of weak radial electric field shear, this mechanism, whose sign is typically in opposition to its ExB counterpart, remains unabated and is thus likely relevant in L-mode plasmas. [1] O. D. Gurcan, et al., Phys.Plasmas 14, 042306 (2007) [2] R. R. Dominguez and G. M. Staebler, Phys. Plasmas 5, 3876 (1993).

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