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Gyrokinetic simulation studies of ExB staircase in KSTAR L-mode plasmas

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It was found that turbulence in hot magnetized plasmas generates a self-organized flow structure which is called ExB staircase [1]. To study the role of ExB staircase, we investigate KSTAR L-mode plasmas using global nonlinear gyrokinetic code gyroKinetic Plasma Simulation Program (gKPSP) [2]. Nonlinear simulations comparing Linear Ohmic Confinement (LOC) and Saturated Ohmic Confinement (SOC) plasmas with KSTAR parameters have been performed. ExB Staircase structure has been found as observed in KSTAR experiments [3] and other gKPSP simulations [4,5]. Staircase structure is only found in SOC plasma, which is consistent with the experimental results of Tore Supra [6]. Non-diffusive avalanche events and intermittent bursts are observed for both cases but they show different properties. These turbulence transport properties and the role of ExB staircase are being investigated.

References

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