I. INTRODUCTION

This brief communication focused on continuing the work Rath et. al[1]. At the end Section IV it was discussed that the circumstances for which the staircase can fully develop are beyond the scope of the paper. To gain more knowledge if the staircase can develop with the chosen box size from Ref 1. This paper will focus on the effects of the box size on the E×B staircase structure and if the wavelength converges with the box size.

II. THEORY

It is known that radially sheared zonal flows plays a significant role in nonlinear stabilization in tokamak plasmas.[2–4]. Through advection on the sheared zonal flows the turbulent structure in plasma gets deformed and tilted that causes an E×B nonlinearty.[3,5,6] Zonal flows mediate spectral energy transfer to larger radial wave vectors.[7–9] The strength of the shearing process is the E×B shearing rate $\omega_{\mathrm{E\times B}}$ which is the radial derivative of the advecting zonal flow velocity.[5,10] The shearing rate $\omega_{\mathrm{E\times B}}$ is defined as

$$\omega_{\mathrm{E\times B}} = \frac{1}{2B}\frac{\partial^2 \langle\Phi\rangle}{\partial \psi^2} \tag{1}$$

where $\langle\Phi\rangle$ is the zonal electrostatic potential and ψ the radial coordinate that labels the flux surfaces.[11,12] It was shown that the nonlinear threshold for turbulence is directly related to shear stabilization.[4] Often the shear stabilization is expressed in the empirical Waltz rule $\omega_{\mathrm{E\times B}} \sim \gamma$,[10,13] where γ is defined as the maximum linear growth rate in the unstable mode. In the discovered zonal flows, also known as E×B staircase[14], exhibit amplitudes in terms of the E×B shearing rate satisfying the stabilization criteria.[1,11]

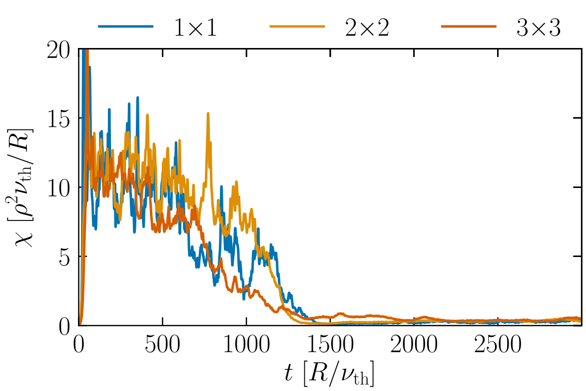

FIG. 1: Time traces of the heat conduction coefficient χ for $R/L_T = 6.0$ for radial and binormal increased boxsizes

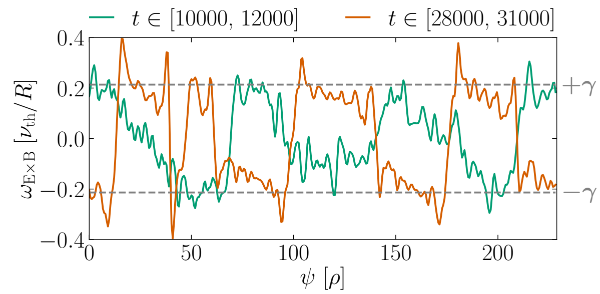

FIG. 2: Shearing rate ω_{ExB} for different time intervals in which heat conduction is almost zero but staircase has not fully developed for boxsize 3×1

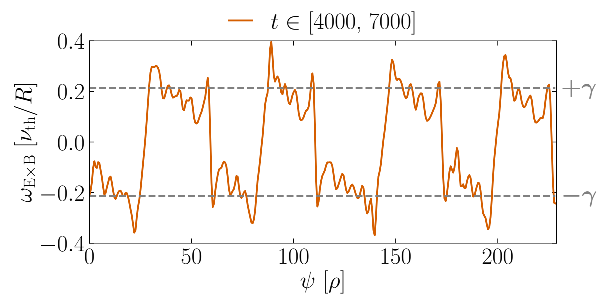

FIG. 3: Stablized shearing rate ω_{ExB} for boxsize 3×3

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Pages	———		**3**	
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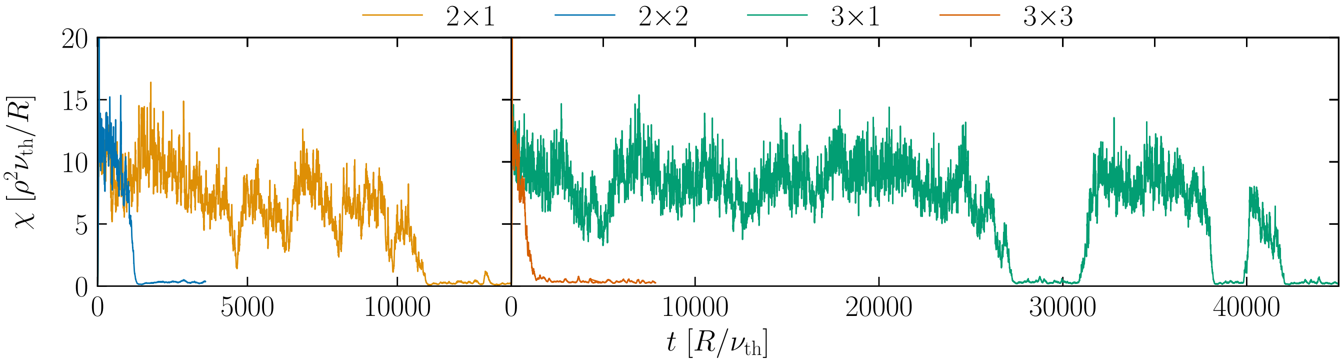

FIG. 4: Comparison of time traces of the heat conduction coefficient χ for $R/L_T = 6.0$ for boxsize 2×1 compared to 2×2 and 3×1 compared to 3×3

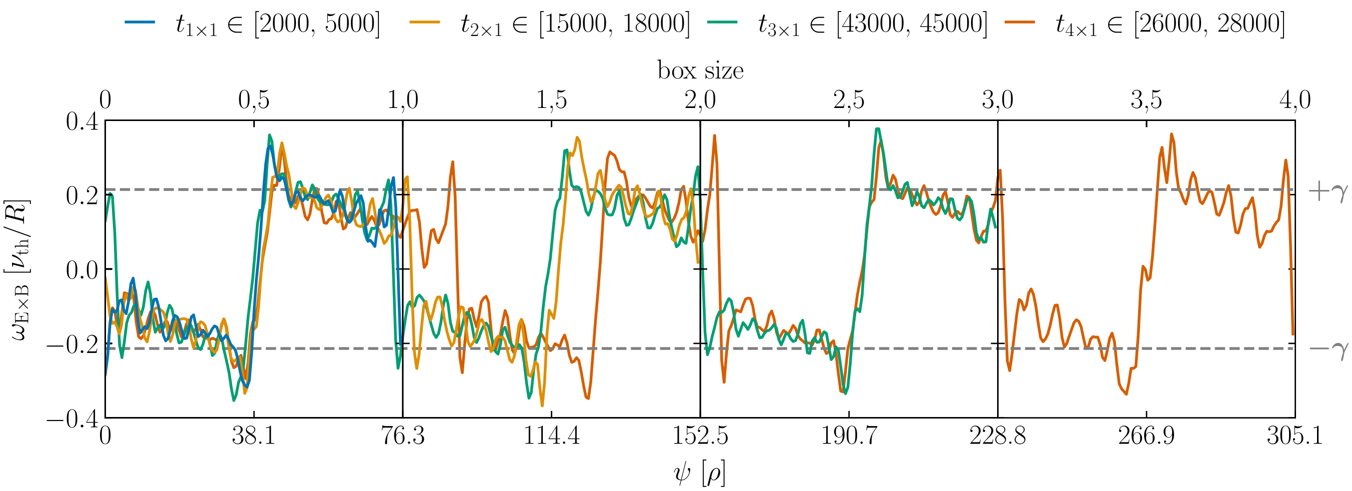

FIG. 5: Comparison of shearing rate $\omega_{\rm ExB}$ for radial increased boxsizes. The staircase structure got shifted for better visibility.

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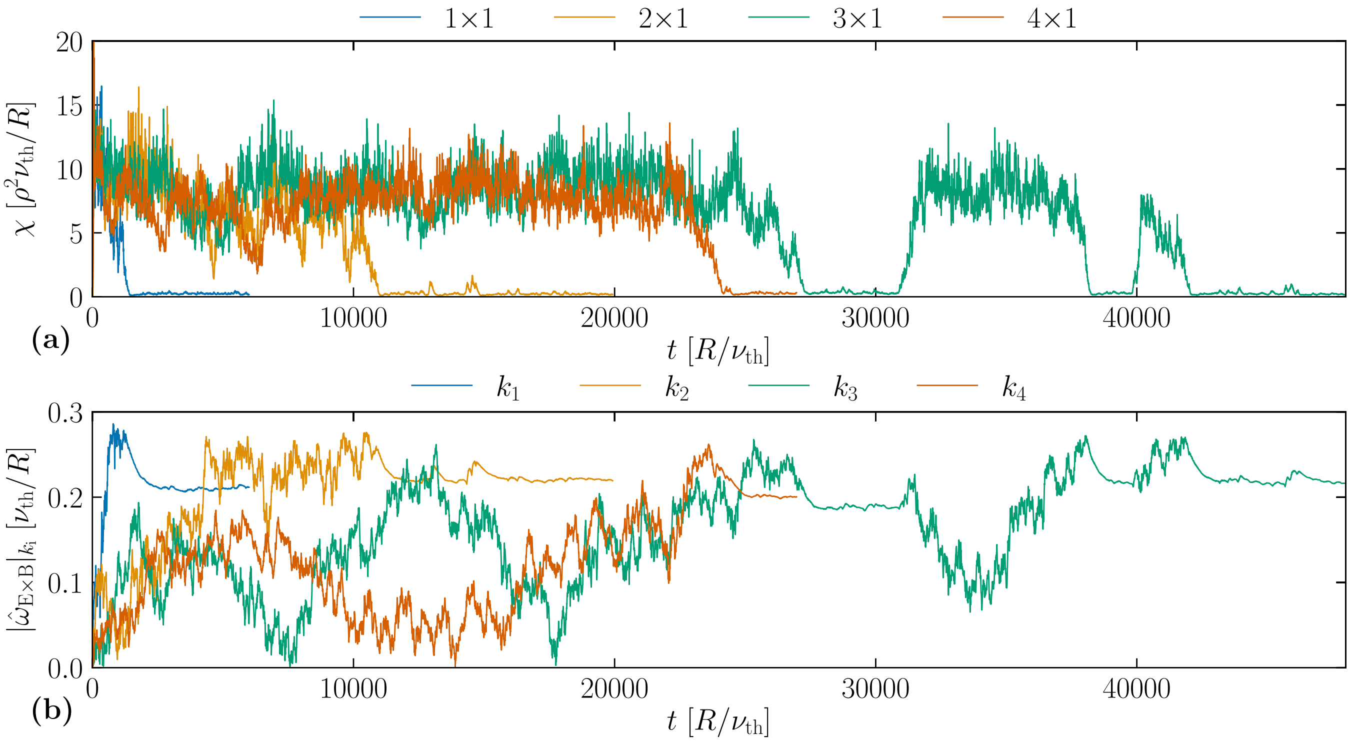

FIG. 6: **(a)** Time traces of the heat conduction coefficient χ for $R/L_T = 6.0$ for radial increased boxsizes
(b) Time traces of $|\hat{\omega}_{\text{E}\times\text{B}}|_{k_\text{i}}$ for radial increased boxsizes