Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

How the self-interaction mechanism affects zonal flow drive and convergence of turbulent transport simulations with system size[1] AJAY CHANDRARAJAN, STEPHAN BRUNNER, Ecole Polytechnique Federale de Lausanne, BEN MCMILLAN, University of Warwick, JUSTIN BALL, Ecole Polytechnique Federale de Lausanne, JULIEN DOMINSKI, Princeton Plasma Physics Laboratory — We use gyrokinetic flux-tube simulations to report a decrease in the shearing rate of ExB zonal flows with increasing system size measured by $1/\rho^*=\mathrm{a}/\rho_\mathrm{i}$, where a is the tokamak minor radius and ρ_i is the ion Larmor radius. This is done in practice by decreasing $\mathrm{k}_{\mathrm{y,min}}\rho_\mathrm{i}$ ($\tilde{}\rho^*$), where $\mathrm{k}_{\mathrm{y,min}}$is the minimum wavenumber along the direction y, bi-normal to the magnetic field. The corresponding gyro-Bohm normalised heat and particle fluxes also increase with decreasing $\mathrm{k}_{\mathrm{y,min}}$. We find that this results from the non-adiabatic passing electron dynamics and corresponding fine structures at mode rational surfaces associated to each k_y mode. The related strong self-interaction mechanism disrupts resonant 3-wave interactions involving the zonal modes. As a consequence, the different k_y contributions to Reynolds Stress driving the zonal flows tend to get decorrelated, which results in the shearing rate level developing a statistical dependence on $\mathrm{k}_{\mathrm{y,min}}$. In adiabatic electron simulations, the scaling is not as severe, owing to a weaker self-interaction mechanism at play.

[1]This work has been carried out within the framework of the EUROfusion Consortium and has received funding from the Euratom research and training programme 2014-2018 and 2019-2020 under grant agreement No 633053. Computations were performed on Piz Daint, CSCS (CH) and Marconi, CINECA (Italy).

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Date submitted: 03 Jul 2019 Electronic form version 1.4