Abstract Submitted
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Coherent enstrophy production and turbulent dissipation in two-dimensional turbulence with and without walls[1] ROMAIN NGUYEN VAN YEN, Ecole Normale Superieure, MARIE FARGE, Ecole Normale Superieure and CNRS, KAI SCHNEIDER, Universite d'Aix-Marseille — In the fully-developed turbulent regime dissipation becomes independent on the molecular viscosity of the fluid for three-dimensional incompressible flows when Reynolds number becomes large enough. We inquire if incompressible two-dimensional turbulent flows may exhibit a similar behaviour in the vanishing viscosity limit. For this we examine the viscosity dependence of the solutions of two-dimensional Navier-Stokes equations in both periodic and wall-bounded domains, for Reynolds numbers varying from 10^3 to 10^7. The vorticity field is split into coherent and incoherent parts by applying the wavelet filter used for CVS [1]. We find that for Reynolds larger than 10^5 the coherent enstrophy dissipation rate tends to become independent of Reynolds, while the total enstrophy dissipation rate decays to zero logarithmically with Reynolds. In the wall-bounded case, we observe an additional production of enstrophy at the wall. As a result, coherent enstrophy diverges when Reynolds tends to infinity, but its time derivative seems to remain bounded independently of Reynolds. [1] M. Farge, K. Schneider and N. Kevlahan, 1999. Non-Gaussianity and Coherent Vortex Simulation for two-dimensional turbulence using an adaptative orthogonal wavelet basis. *Phys. Fluids.*, **11**(8), 2187-2201.

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