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Interactions between mean flow and turbulence in the 2D condensate CORENTIN HERBERT, Ecole Normale Superieure de Lyon, GREGORY FALKOVICH, ANNA FRISHMAN, Weizmann Institute of Science — Understanding the interaction of a mean flow with turbulent fluctuations is a central problem in turbulence theory. Here, we shall tackle this issue in the framework of incompressible 2D turbulence in a finite box. In the presence of small-scale energy injection and small large-scale friction, the inverse cascade of energy leads to a stationary state made of a pair of coherent vortices, upon which incoherent turbulent fluctuations are superimposed. Due to the time scale separation between the mean-flow and turbulence, an asymptotic expansion of the hierarchy of moments can be carried out to obtain closed equations describing both the mean flow and the fluctuations profiles. Using extensive numerical simulations, we will test the validity of these analytical predictions. In particular, we will discuss how the components of the Reynolds stress tensor scale with both distance from vortex core and large scale friction, which is the small parameter in the theory.

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