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Interaction of two-dimensional turbulence with a sheared channel flow: a numerical study LEON KAMP, VITOR MARQUES ROSAS FERNANDES, GERTJAN VAN HEIJST, HERMAN CLERCX, Eindhoven University of Technology — Interaction of large-scale flows with turbulence is of fundamental and widespread importance in geophysical fluid dynamics and also, more recently for the dynamics of fusion plasma. More specifically the interplay between two-dimensional turbulence and so-called zonal flows has gained considerable interest because of its relevance for transport and associated barriers. We present numerical results on the interaction of driven two-dimensional turbulence with typical sheared channel flows (Couette and Poiseuille). It turns out that a linear shear rate that is being sustained by moving channel walls (Couette flow) is far more effective in suppressing turbulence and associated transport than a Poiseuille flow. We explore the mechanisms behind this in relation to the width of the channel and the strength of the shear of the background flow. Also the prominent role played by the no-slip boundaries and the Reynolds stress is discussed.

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