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Wind-driven turbulent oscillating channel flow under a stable stratification WERNER KRAMER, HERMAN CLERCX, Eindhoven University of Technology, VINCENO ARMENIO, Università degli Studi di Trieste — We use large-eddy simulations of a turbulent oscillating channel flow to investigate the effects of wind forcing and stratification. This kind of flow is a model for the tidal driven flows in estuaries. In our studies the wind is aligned with the oscillating tidal flow, leading to a pulsating mean flow. Turbulent fluctuations are enhanced in the shear layers present at the no-slip bottom and below the free-surface boundary. A stable density stratification arises from a constant solar heating of the free surface. We will report on the mixing properties and on the structure of the turbulent fluctuations of such flows. During phases with high turbulent activity the whole fluid column is well-mixed except for the free-surface layer. When turbulence levels drop the stratification extends over the entire fluid column, but does not penetrate the bottom boundary layer. A stable density stratification suppresses vertical transport. In the unstratified case turbulence generated in top and bottom layer interact. Whether the interaction can be suppressed by a stable density stratification is an interesting point for further investigation.

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