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Turbulent oscillating channel flow subjected to wind stress W. KRAMER, H.J.H. CLERCX[1], Fluid Dynamics Laboratory, Eindhoven University of Technology, The Netherlands, V. ARMENIO, Dipartimento di Ingegneria Civile e Ambientale, Universita degli Studi di Trieste, Italy — The Westerschelde estuary in the Netherlands is characterized by a strong tidal driven flow with typical velocities in the range of 0.2 to 1 m/s. In addition to the tides the wind (5 m/s) exerts a stress at the free surface driving the upper fluid layers. To investigate this flow we performed resolved Large Eddy Simulations for a generic configuration: a periodic 3D channel domain with an oscillating pressure gradient over the channel length, a fixed wind stress at the flat free-surface and no-slip conditions at the bottom boundary. The wind stress drives a unidirectional flow, which in combination with the oscillating (tidal) part generates a strong shear-layer near the free surface. In this shear layer and in the shear layer near the no-slip bottom turbulence is strongly enhanced. Subsequently, the turbulence is spreading over a larger part of the domain, where it has a large influence on the dispersion of particles. The study is extended by including the effects of rotation and stratification.

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