# Large eddy simulations for quasi-2D turbulence in shallow flows

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Shallow flows are confined turbulent shear flows and widely observed in nature. Estuaries as well as coastal regions have a very shallow bathymetry [*Jirka and Uijttewaal 2004*]. The confined turbulent shallow flows are characterized by two distinct separated scales of turbulence: the three-dimensional turbulence generated by the wall bounded shear flow, and the quasi-2D turbulence with vortex scales typically larger than the water depth [*Nadaoka and Yagi 1998*]. The quasi-2D turbulence might be created due to a topographic forcing, internal transverse shear instabilities, or secondary instabilities of the base flow [*Jirka and Uijttewaal 2004*]. The three-dimensional large eddy simulation (3D-LES) is not feasible for large-scale applications due to the limitation of the present computing capacity. Thus, the two-dimensional large eddy simulation (2D-LES) is a useful tool, in which the only resolved motion is the quasi-2D turbulence [*Awad 2005*].

In this study, the performance of our two-dimensional large eddy simulation module developed at the University of Leuven (2D-LES, KULeuven module) [*Awad 2005*] is assessed.

The results of the 2D-LES, KULeuven module based on a one-length and a two-length subgrid scale models are analyzed. A comparison has also been conducted between the outputs of the 2D-LES, KULeuven module and another LES code developed at the University of Brussels (LES-VUB). These two codes have been implemented for a backward facing step (BFS) flow test case.

It has been found that the two-length scale approach produces more elongated and less isotropic vortex comparing to the one-length scale model.

## REFERENCES

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