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Turbulent Parametrizations of Turbulent flows

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This work is a study about the different turbulent models existing and their role in environmental flows. The code TELEMAC 3D as well as other RANS and LES codes aplicable to fully turbulence flows are compared. We quantify and classify the different models of turbulence that work best in non-homogeneous and complex flows in function of the number of solved equations and boundary conditions. Then we carry out some test cases to compare the results with experiments and field observations.
The full DNS resolution of Navier-Stokes equations is possible only for the simple BC cases and low Reynolds numbers. It involves a great power of computing but there exists an alternative to resolving Navier-Stokes equations if we just want the mean value of quantities (velocity, pressure, temperature...). We apply the mean operator in the motion equations; therefore a Reynolds's decomposition on the unknowns. The new equations are called RANS in opposition of the motions equations
The comparison shows differences between these models, especially the form and local shape of the turbulence magnitudes. The biggest differences are found for stratified flows with a test case producing a mixing zone between the two different fluids. The channel and the horizontal mesh are the same. For the vertical mesh, we refine the mixing zone and compare it with salt wedges and estuarine mixing results.