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Numerical simulation of stratified flows from laboratory experiments to coastal ocean

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Numeric modeling of a flow past vertical strip uniformly towing with permanent velocity in horizontal direction in a linearly stratified talk which was based on a finite differences solver adapted to the low Reynolds Navier-Stokes equation with transport equation for salinity (LES simulation [6]) has demonstrated reasonable agreement with data of schlieren visualization, density marker and probe measurements of internal wave fields.

Another approach based on two different numerical methods for one specific case of stably stratified incompressible flow was developed, using the compact finite-difference discretizations. The numerical scheme itself follows the principle of semi-discretisation, with high order compact discretisation in space, while the time integration is carried out by the Strong Stability Preserving Runge–Kutta scheme. Results were compared against the reference solution obtained by the AUSM finite volume method [7].

The test case allowed demonstrating the ability of selected numerical methods to represent stably stratified flows over horizontal strip [4] and hill type 2D obstacles [1, 3] with generation of internal waves.

From previous LES [4] and RANS [8] realistic simulations code, the ability of research codes to reproduce field observations is discussed.

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