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WIND EFFECTS ON THE DYNAMICS OF TWO-LAYER DENSITY-STRATIFIED FREE SURFACE FLOWS IN STRAITS

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Summary. Two-layer density stratified free surface flows are commonly observed in river confluences and estuaries. We used an interface capturing method to numerically model both the sharp interface (air/water interface) and diffuse interface (water/water interface). A three-phase level set method (LSM) is used to numerically model three-dimensional two-layer density-stratified two-phase flow. LSM method is implemented into a three-dimensional, incompressible, unsteady Reynolds-averaged Navier-Stokes (RANS) solver that uses a generalized curvilinear coordinate system. The model uses wide range of turbulence models from Reynolds-averaged Navier-Stokes to Spalart-Allmaras based Detached Eddy Simulation. The model is applied to a realistic three-dimensional, density stratified free-surface problem under strong winds and the results are verified with field measurements. Strong winds affect upper-layer thickness as well as mixing layer height between two layers.