On the conservative tracer transport by nonlinear Kelvin wave.

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This study investigates the influence of nonlinearity of the internal Kelvin wave on the conservative tracer transport in the coastal zone using numerical simulations. The pycnocline is characterized by its depth and thickness. We analyze the evolution of the conservative trace concentration field under influence of the impulse wave disturbance in the linear and nonlinear cases. Our numerical simulations show that there are two different scenarios for the evolution of the conservative tracer field. In the linear case the Kelvin wave resulted to formation of the “wake” within the conservative tracer concentration field and then tracer flux along the wave propagation. In contrast with the linear case in the nonlinear case after the formation of “wake” the part of tracers trapped by the pycnocline and then it’s formed the quasi-vortex structure within the concentration field.

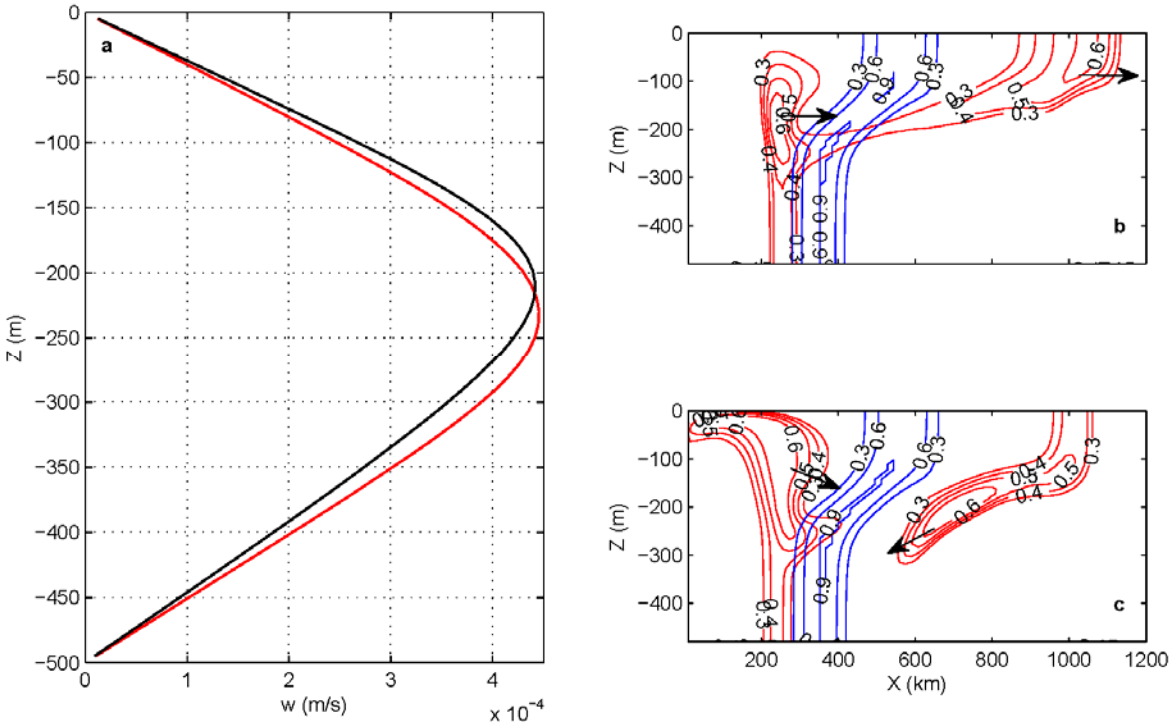

Fig.1 (a) Vertical component of Kelvin wave velocity. Linear case (black line) and nonlinear case (red line). (b) Concentration of conservative tracers after wave interaction in linear case: after 10 times of wave interaction (blue line) and after 42 times of wave interaction (red line). (c) Concentration of conservative tracers after wave interaction in nonlinear case: after 10 times of wave interaction (blue line) and after 42 times of wave interaction (red line). Arrows show a direction of conservative tracer propagation.