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Ship wakes in Tallinn bay: experimental and numerical study

Tomas Torsvik

Abstract

High-speed ferries are known to generate wakes with unusually long periods, and occasionally large amplitudes which may serve as a qualitatively new forcing factor in coastal regions that are not exposed to a sea swell. An intrinsic feature of such wakes is their large spatial variation. We analyze the variability of wake conditions for the coasts of Tallinn Bay, the Baltic Sea, a sea area with very intense fast ferry traffic. The modeled ship wave properties for several GPS-recorded ship tracks reasonably match the measured waves in terms of both wave heights and periods. It is shown that the spatial extent of the wake patterns is very sensitive to small variations in sailing conditions. This feature leads to large variations of ship wave loads at different coastal sections with several locations regularly receiving high ship wave energy.