HARES

WAVE PENETRATION MODELLING

HARES (“HARbour RESonance”) is a two-dimensional numerical model for the determination of short wave propagation in near-shore domains, e.g. harbour basins. The model is based on the 2D Mild-Slope Equation and includes the physical phenomena of diffraction, refraction, shoaling, (partial) reflection, (partial) transmission, non-linear bottom friction, non-linear wave breaking, directional spreading and frequency spreading. HARES has been developed in-house by Svašek Hydraulics.

HARES is based on the Finite Element approach and applies a flexible mesh with triangles. This offers almost unlimited flexibility in grid generation. Special features, like complicated harbour and breakwater layouts can be accurately incorporated in the grid. HARES is highly parallelised for efficient calculations on our in-house computational HPC cluster. HARES is very fast and can be applied interactively in port design processes.

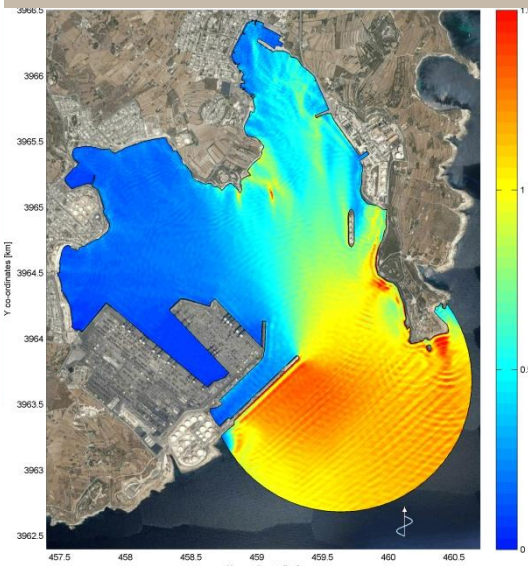
HARES can deal with (partially) reflecting structures in a harbour and also with breakwaters which have partial transmission and reflection properties. Comparison with measured wave conditions inside a harbour basin in a laboratory test proved that HARES provides accurate results. The most recent improvement to the model is the addition of an accurate and very fast spectral treatment of bottom friction and wave breaking based on the entire wave spectrum, inspired after the spectral wave-energy model SWAN.

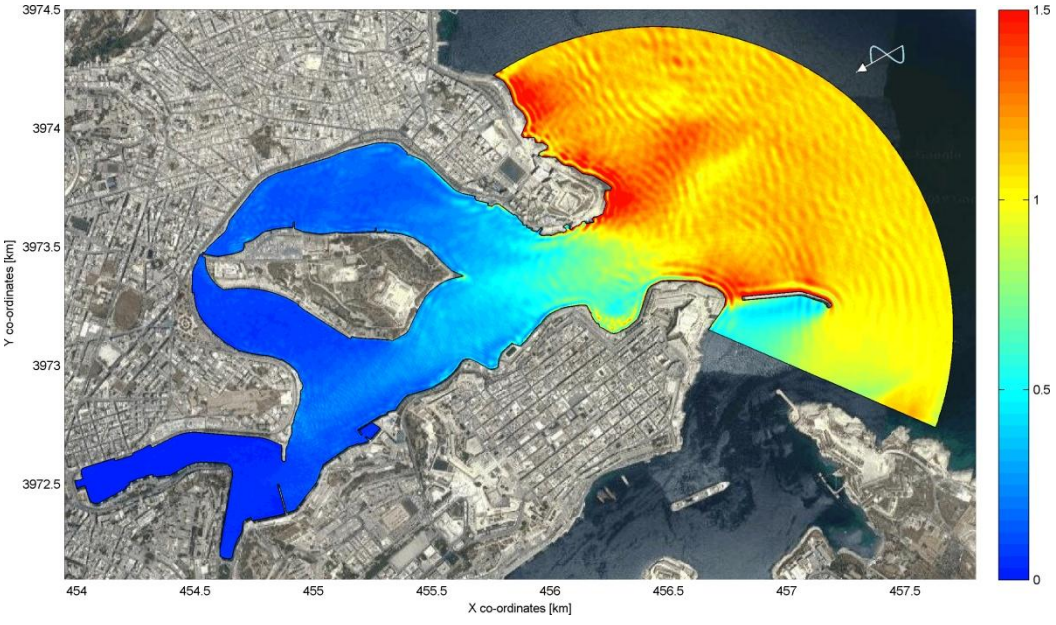
DEVELOPER

Svašek Hydraulics

MAIN FEATURES

- wave propagation over topography and in harbour basins,
- diffraction,
- refraction,
- shoaling,
- (partial) reflection,
- (partial) transmission,
- non-linear bottom friction,
- non-linear wave breaking (depth- or steepness-induced),
- monochromatic versus spectral computations (frequency spreading and directional spreading).





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