

# Wave Impact on Harbours

**The fast tool to obtain accurate wave conditions in and around your harbour**

WIHA (Wave Impact on Harbours) is a phase-resolving numerical wave model that allows for fast and accurate computation of wave conditions in and around harbours. Its ease of use and short simulation times allow for WIHA to be used in the early phases of the design or tender phase of engineering projects. Phases in which a project can benefit most of the insights in the interaction between structures and waves. Moreover, the model enables making vast amounts of calculations with high accuracy during detailed design phases.

## **New solution**

WIHA provides a new solution to the problem of limited time for design optimizations. Within hours, we can present the first calculation to our clients with the in-house version of the model. At the same time, its high accuracy and optimized numerical scheme allow for deriving extensive datasets of wave conditions that can be used for e.g., harbour improvement, DMA studies or the assessment of flood safety.

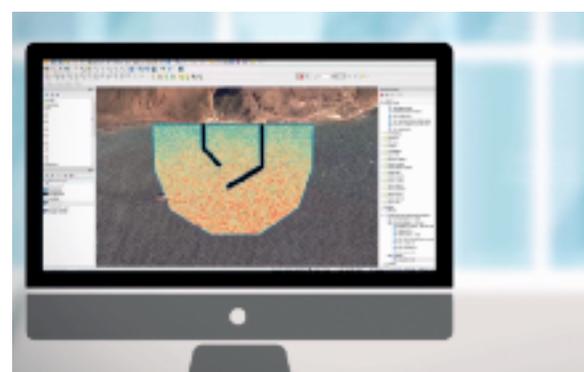
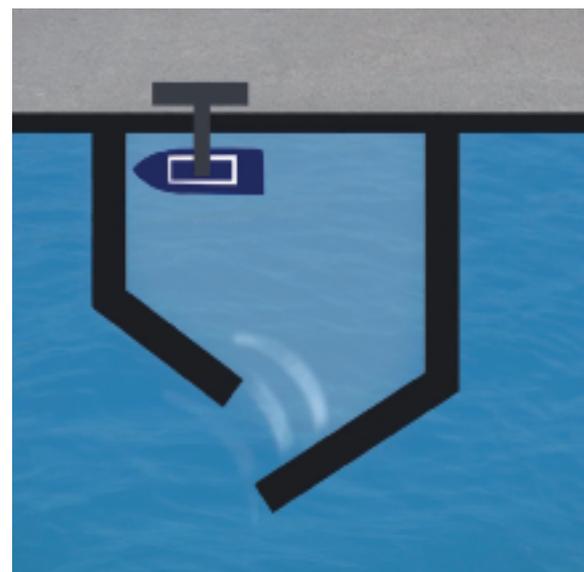
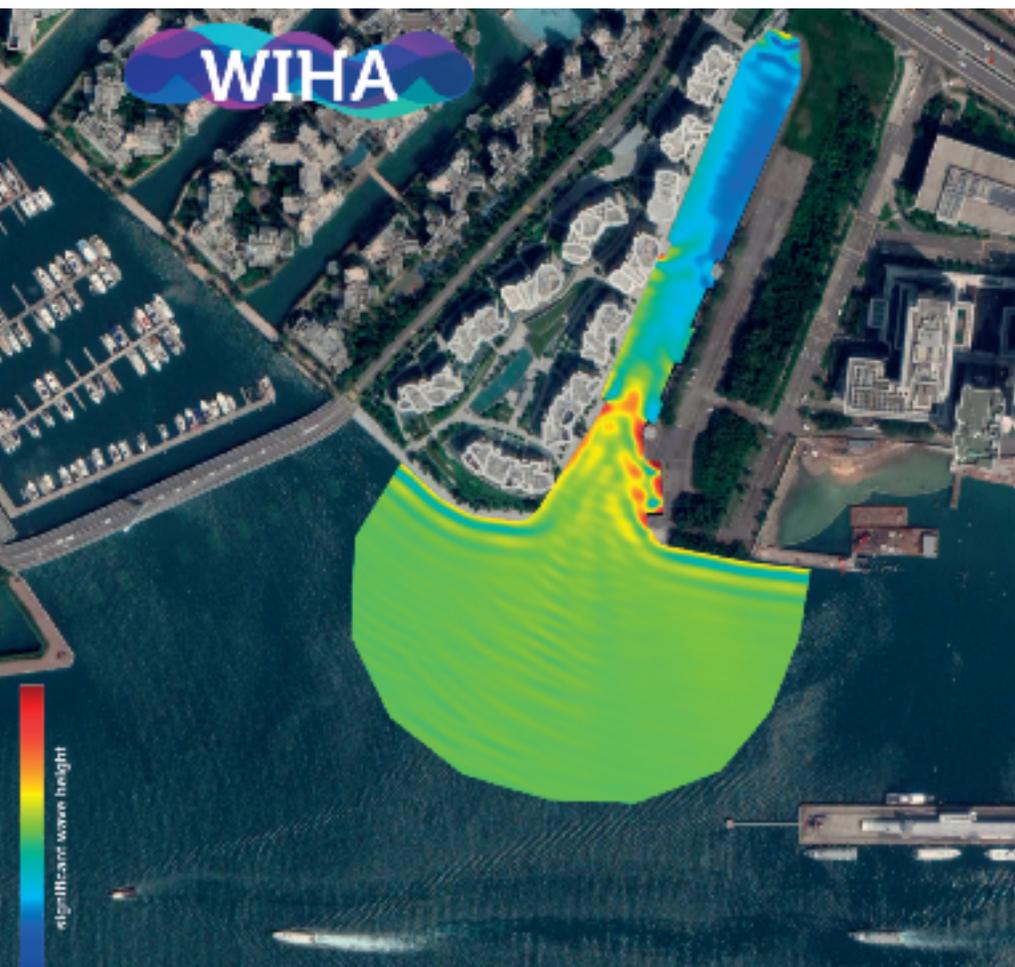
## **Easy model set-up**

The user-friendly interface of WIHA in a GIS environment makes for a quick and convenient model set-up. Geometry adaptations are easy to make and fast computation allows the user to simulate wave conditions in harbours for various layouts.

## **Benefits**

- quick preliminary insight in wave processes
- optimization of breakwater layout or harbour
- direct input for mooring analysis and downtime-studies.

[www.witteveenbos.com/news/developing-wiha-success-by-failure/](http://www.witteveenbos.com/news/developing-wiha-success-by-failure/)



### Features

WIHA accounts for the combined effects of refraction, diffraction and shoaling and applies the finite element method to solve the mild-slope equation on an unstructured triangular grid. The model takes into account the following processes:

- wave propagation over varying bathymetry
- wave penetration into harbour basins
- refraction
- diffraction
- shoaling
- (partial) reflection (by structures or variations in bed-slope)
- spectral wave computations (including frequency- and/or directional spreading)
- monochromatic wave computations for harbour resonance studies.

### Development and collaboration

WIHA is an innovative tool that is continuously evolving and improving. We welcome opportunities to collaborate in this development and the application of WIHA on a project-basis. Please refer to the contact information below.

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**The solution to calculate wave penetration in harbours within hours.**