

MIKE 21

2D modelling of coast and sea

MIKE 21 is by far **the most versatile tool for coastal modelling**. If you need to **simulate physical, chemical or biological processes** in coastal or marine areas, MIKE 21 has the tools you need.

APPLICATIONS

The following is a small subset of the almost endless list of possible MIKE 21 applications.

TYPICAL APPLICATIONS

MIKE 21 is the ideal software for:

- Design assessment for coastal and offshore structures
- Optimisation of port layouts and coastal protection measures
- Cooling water, desalination and recirculation analysis
- Optimisation of coastal outfalls
- Environmental impact assessment of marine infrastructures
- Ecological modelling including optimisation of aquaculture systems
- Optimisation of renewable energy systems
- Water forecast for safe marine operations and navigation
- Coastal flooding and storm surge warnings
- Inland river, flooding and overland flow modelling
- Integrating vegetation into coastal defence strategies and coastal zone management planning
- Modelling of tailings dam failures (non-Newtonian flow)

ENGINES

MIKE 21 offers our state of the art **Flexible Mesh (FM)** simulation engine which allows maximum flexibility for adapting grid resolution of the model domain.

The core numerics of MIKE 21 are continuously improved to ensure unrivalled stability, performance and accuracy.

PARALLEL PROCESSING (CPU)

All Flexible Mesh engines support parallel processing. The Flexible Mesh (FM) engines show excellent performance when parallel processing is undertaken - also on a large number of computational cores. On multicore Windows computers, parallelisation is menu-driven and straightforward.

The FM engines are also available for Linux, which gives the possibility to utilise High Performance Computing (HPC) systems.

GRAPHICAL PROCESSING UNITS (GPU)

For the FM engines, the use of graphical processing units (GPU) is also supported and gives easy access to spectacular increases in simulation speed for hydrodynamic and advection-dispersion (transport) calculations.

MODULES

MIKE 21 is modular. You buy what you need and nothing more. It includes a wide range of modules, allowing you to create your own tailored modelling framework for your coastal and marine studies.

PP - PREPROCESSING AND POSTPROCESSING

This module offers an integrated work environment which provides convenient and compatible routines to ease the tasks of data input, analysis and presentation of simulation results.

HD - HYDRODYNAMICS

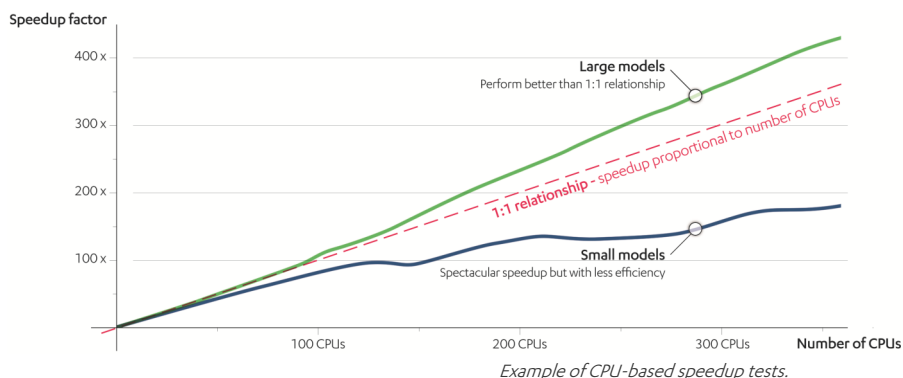
This module simulates water level variations and flows in response to a variety of forcing functions. HD has numerous built in structure options (from simple weirs to tidal turbines), and many innovative features (for example, complex infrastructure calculations for flooding in cities, and flow calculations of mud, debris or oil).

AD - TRANSPORT

This simulates the transport, dispersion and decay of dissolved or suspended substances. It is typically used in cooling water and wastewater discharge studies.

COUPLED MODELLING

The FM series include a powerful, integrated system which, in a surprisingly easy manner, combines wave, flow and sediment transport models into a fully dynamic morphological model.





MODULES

MIKE 21 includes the following modules specifically for sediment transport and water quality modelling.

ST - SAND TRANSPORT

This is an advanced sand transport model with several formulations for current as well as current-wave generated transport, including 3D description of sediment transport rates. It is, for example, used for morphological optimisation of port layouts, impact of shore protection schemes and stability of tidal inlets.

MT - MUD TRANSPORT

This is a combined multi-fraction and multi-layered model that describes erosion, transport and deposition of mud (cohesive sediment) or mixtures of sand and mud. It is also possible to simulate non-Newtonian fluids via time and space varying fluid properties (including density, Bingham fluid viscosity and yield stress).

PT - PARTICLE TRACKING

This module simulates transport and fate of dissolved and suspended substances, including sediments.

SM - SHORELINE MORPHOLOGY

This module combines detailed 2D modelling of currents and waves with a constrained morphological model, making it possible to undertake fast, stable and robust modelling of shoreline evolution in 2D environments.

OS - OIL SPILL

This module simulates the spreading and weathering of hydrocarbons and is used for oil spill modelling.

MIKE ECO LAB - ECOLOGICAL MODELLING

This is a complete numerical laboratory for water quality and ecological modelling. See page 24.

ABM LAB - AGENT BASED MODELLING

This is a flexible numerical laboratory used to define agents, their behaviour and states. See page 23.

MODULES

MIKE 21 includes the following modules specifically for wave modelling.

SW - SPECTRAL WAVES

This is a spectral wind-wave model that simulates the growth, decay and transformation of wind-generated waves and swell.

BW - BOUSSINESQ WAVES

The state-of-the-art tool for studies and analyses of wave disturbance in ports, harbours and coastal areas. It includes full surf and swash zone dynamics.

MA - MOORING ANALYSIS

This module simulates the motions of single or multiple vessels subject to winds, waves and currents. It also calculates the forces in the mooring equipment such as fenders and mooring lines and can directly use results from MIKE 21 BW, MIKE 3 Wave FM and MIKE 21 HD as input.

SELECTED TOOLS IN MIKE 21

In addition to its variety of modules, MIKE 21 also includes a number of tools to optimise your work. Here is a subset of tools:

- Global tide data and tools for tidal analysis and prediction
- Cyclone wind generation and wind generation from pressure maps
- Advanced mesh and grid generators and editors
- Advanced tools for generation of graphical output
- An interface (API) for reading and modifying files in MIKE 21's internal, binary format

BENEFITS

MIKE 21 is proven technology. No other modelling package has been used for as many coastal and marine engineering projects around the world as MIKE 21.

The recipe for the unique success of MIKE 21 is simple. It gives you maximum flexibility, higher productivity and full confidence in the results.

Also, MIKE 21 is much more than just the right tool for your project. It also gives access to other benefits of MIKE software products, including unparalleled technical support, training courses and access to DHI's expertise and know-how regardless of where you are in the world.

MIKE 21 also comes with a wealth of first class tools that enhance and ease modelling possibilities.

MIKE C-MAP and MIKE ANIMATOR PLUS

Setting up the basic model bathymetries is normally a tedious and expensive part of coastal and marine modelling projects. MIKE C-MAP can reduce this task to minutes, offering model bathymetries generated fast and easy from an electronic chart database. With MIKE C-Map, you no longer need to manually digitise your model bathymetries.

Regardless of how well you undertake your modelling work, clear communication of results is crucial to its value and recognition. MIKE ANIMATOR PLUS turns model results into amazing 3D video presentations, facilitates communication between specialists and non-specialists, and demonstrates your modelling insights better than any printed material.