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

3-in-1

The unique 3-in-1 package includes all three engines in one great package deal.

MIKE 21 comprises the following simulation engines:

- Single Grid, which is a classic rectilinear model that is easy to set up and with easy I/O exchange
- Multiple Grids, which is a dynamically nested rectilinear model with the ability to focus the grid resolution
- Flexible Mesh, which allows maximum flexibility for adapting grid resolution of the model domain

PARALLEL PROCESSING (CPU)

All Flexible Mesh and Single Grid 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.

ENGINES

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.

AD - ADVECTION-DISPERSION

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

Example of CPU-based speedup tests.
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.

**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 20.

**ABM LAB - AGENT BASED MODELLING**
This is a flexible numerical laboratory used to define agents, their behaviour and states. See page 19.

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 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
- MIKE’s Climate Change Editor
- 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

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**
MIKE C-Map offers model bathymetries generated fast and easy from an electronic chart database. MIKE ANIMATOR PLUS turns model results into amazing 3D video presentations. Both applications are free and available if you hold a valid Service and Maintenance Agreement (SMA) for Professional License.