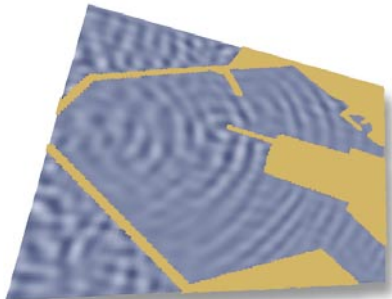


Numerical Modeling

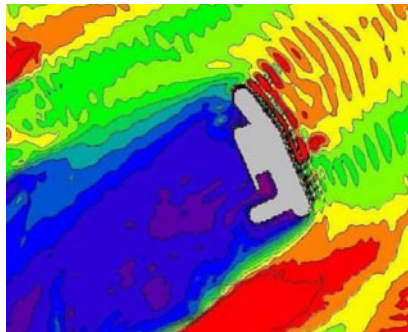
Ben C. Gerwick, Inc. uses advanced numerical modeling as an integrated tool in marine engineering projects. MIKE 21 and LITPACK are state-of-the-art comprehensive numerical modeling systems that address all aspects of hydrodynamic processes related to ports, coastal and inland waters. The models have unsurpassed capabilities within the following key areas:

Ports, harbors and inlets:

- Port planning.
- Wave agitation inside harbors.
- Assessment of down-time.
- Seiching phenomena.
- Sedimentation in trenches and access channels.
- Simulation of spill plumes from dredging.
- Water quality.
- Assessment of the resonant amplification of non-linear, sub-harmonic waves inside ports.
- Advection and dispersion of contaminants.



Modeling of harbor wave disturbance (above) and aerial view of harbor (below).

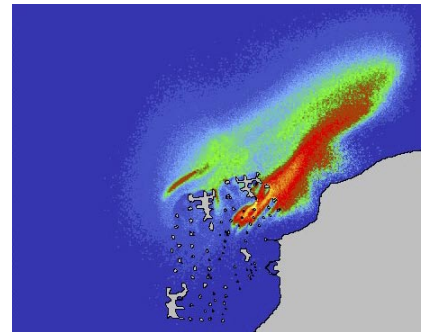


Numerical modeling of wave disturbance behind breakwater at Caleta La Mision Port, Argentina.

Coastal and Inland Waters:

- Evolution of non-linear, frequency dispersive, irregular waves.
- Wave forecasting.
- Coastal currents and shelf dynamics.
- Wind- and wave-induced currents.
- Hydrodynamic design parameters.
- Longshore littoral transport.
- Shoreline recession and accretion.
- Morphodynamics around coastal structures.
- Land reclamation.
- Flooding.
- Wetlands restoration.
- Stability of infill materials.
- Concentration and dispersal of sediments, bio-degradable material, and toxins.
- Spill from outlets and other sources
- Disposal of contaminated dredged material.

Recorded time series and statistically analysed hydrographic and meteorological data are used as input for the models. Large-scale regional models are then developed to transfer offshore conditions to the near-shore region. Results from the regional models are used as basis for more detailed models that include the shoreline and port or harbor layout.



Simulation of spill plumes arising from dredging operations at Danaat Howar Islands, Bahrain.

The detailed models are valuable in studies to determine the effects of open or closed marine structures as well as movement of ships in relation to berthing and mooring.



Doha Bay aerial view and assessment of near-shore circulation currents using MIKE 21.

