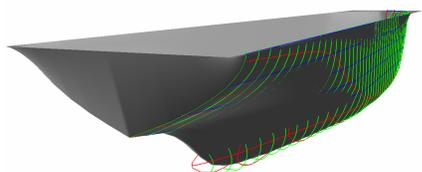


*Complicated port geometry can be accurately included in the SGH model*



*The model's use of accurate hull geometry eliminates the need for calibration.*

### SHIP-GENERATED HYDRODYNAMICS (SGH) MODEL

The Ship-Generated Hydrodynamics (SGH) model is a state-of-the-art model for the simulation of flows generated by displacement vessels. Developed by Coldwater Consulting staff, the SGH model uses a phase-averaging approach to solve the far-field hydrodynamics problem as separate, yet fully-coupled, components; the long-period drawdown, short-period wake and propwash.

The wake sub-model is based on the conservation of wave energy and the kinematic conservation principle. The theory has been extended to include the effects of diffraction and interaction with depth-averaged currents. Transformation of the wake in shallow water, including breaking and the generation of nearshore currents, is also modeled. The drawdown sub-model is based on the conservation of mass and momentum and is driven by the moving hull shape. Transformation of the drawdown wave is fully modelled, including shoaling into destructive transverse stern waves in shallow water. Propwash is modelled via a jet-flow module.

The SGH model allows use of complex channel geometry and bathymetry, variable bottom roughness, river currents and variable sailing paths/speeds in the waterway. The drawdown sub-model is formulated to permit the use of realistic hull shapes and use of this type of boundary condition has been found to greatly improve model accuracy and to eliminate the need for calibration. The wake sub-model is equipped with an auto-calibration mode for accurate wake generation.

The SGH model has been validated against field data collected at several sites and has been applied in engineering studies throughout North America to investigate:

- berthed vessel response to passing vessels
- development of design criteria for shore structures
- shoreline erosion problems
- channel downcutting

A curvilinear-grid version of SGH has recently been developed specifically for use in curved navigation channels.