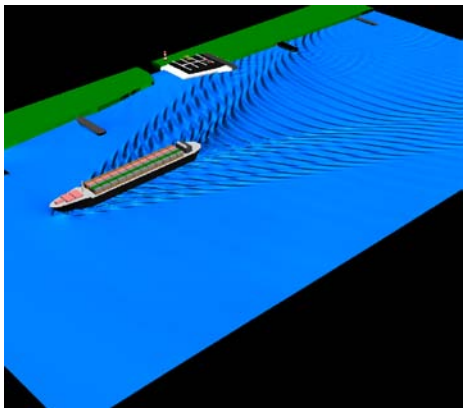
US Army Corps of Engineers®
Engineer Research and Development Center

Boussinesq Modeling Technology (BMT) for Navigation Applications

Description



The BMT consists of a set of comprehensive numerical modeling systems based on a time-domain solution of Boussinesq-type equations for simulating waves (wind-waves and vessel-generated waves) and their propagation in coastal regions, harbors, and waterways. The BMT represents most of wave phenomena of interest in the nearshore zone for navigation projects, inlets, harbors, levees, structures, reefs, wetlands, ship-wakes, wave-ship-bank interactions and wave-current-structure interactions. The BMT based engineering analysis systems may be used in navigation infrastructure design with a risk-based probabilistic design approach to evaluate life-cycle cost of alternatives, operation and maintenance of coupled systems in deciding the benefit or negative consequences of structures in projects. The BMT has capability of replacing considerably more expensive physical models, with flexibility and generality for extension to sediment transport and morphology change, channel infilling, and water-quality issues.

Issue

The Corps O&M budget for dredging navigation channels will increase with calls for deepening and widening channels to accommodate future fleets having larger vessels and drafts. Ship-to-ship and ship-to-bank interactions and risk of accidents will also increase with these demands. Aging and natural deterioration of navigation structures increases ship transit and maneuvering risks along the high-traffic shipping routes, channels, and ports.

Users

Corps Districts, ports/harbors/marinas, designers, shipping companies, pilot associations. Corps programs include SWIMS, CIRP, Flooding, Risk, Levees and Asset Management.

Products

Engineering toolboxes called BMT_Waves, BMT_NavSys, BMT_Structures, and BMT_Levees. Technology implemented in the SMS, and computing planned for PCs and super-computers. Products include TRs, CHETNs, journal and conference papers, and workshops. Non-Navigation products are being leveraged with other R&D programs.

Benefits

The BMT based engineering design tools will help the Corps to save cost of O&M activities, and in the planning and management of navigation assets. These tools will provide support to projects, and help Corps perform risk-based engineering studies.

Corps Program

Navigation Systems Research Program, Mr. Charles E. “Eddie” Wiggins, Program Manager.

Point of Contact

Dr. Zeki Demirbilek, CEERD-HN-HH, e-mail: zeki.demirbilek@usace.army.mil, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199. Additional information can be found at http://chl.erdc.usace.army.mil.