US Army Corps of Engineers®
Engineer Research and Development Center

Improved Ship Simulation

Description

The CADET (Channel Analysis and Design Evaluation Tool) is a probabilistic model for predicting ship underkeel clearance in the design of deep-draft entrance channels. It includes modules for (a) ship squat (sinkage of a ship in shallow water due to flow past the hull), and (b) Response Amplitude Operators (RAO) for ship vertical motions due to waves. The CHL Ship/Tow Simulator (STS) is the modeling tool used by the Corps to define the horizontal requirements for most of our country's navigation channels. In addition to providing tools and guidance for the Corps, this work will improve the STS capabilities, especially in the vertical dimension. This work will also contribute to PIANC WG49 effort to update the 1997 approach channel design guidance for horizontal and vertical dimensions.

Issue

Existing channel design methodologies must be revised to incorporate more physics-based solutions with quantifiable uncertainties and error estimates involved in planning, design, operation, and maintenance of navigation systems.

Users

Corps Districts, channel designers and planners, shipping companies, pilot associations.

Products

The PIANC WG49 report will aid in updating USACE EM 1110-2-1613 on channel design guidance. CADET will be the cornerstone of the Corp's new deep-draft navigation toolkit that will include (a) ship squat formulas, (b) RAO calculators, (c) databases of ship lines and Response Amplitude Operators (RAO), and (d) software for program I/O. There will also be a database and engineering "tools" to enhance STS capabilities, as well as papers, reports, CHETNs, workshops, and PROSPECT courses.

Benefits

The Corps spends $1B/yr dredging navigation channels, with the cost exceeding $1M/ft of depth in hard bottoms. Work unit products will help the Corps Districts in the planning, engineering and maintenance of navigation channels. These tools will provide support to projects, and help Corps perform risk-based engineering studies.

Corps Program

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Point of Contact

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