



US Army Corps  
of Engineers®

Engineer Research and  
Development Center

# Navigation Systems Research Program

## Improved Ship Simulation

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**Problem** The Corps is under increasing pressure to provide ports and waterways that can accommodate a growing economy. The nation's existing navigation system cannot meet the projected trends in both traffic growth and vessel size. To safely and economically meet these demands, it is imperative that we have the most accurate means of predicting requirements for channel depth and width, and vessel maneuvering during transit. 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 our deep draft navigation systems.

**Research Approach** The CHL Ship/Tow Simulator (STS) is the modeling tool used by the Corps to insure safe and economical navigation channels for U.S. ports. In relatively sheltered channels away from the influence of waves, the STS adequately predicts surge, sway and yaw that affect channel width and alignment design. The STS is limited in its real time calculations of ship motions, ship squat, wave directionality, and ship-ship interactions in confined channels. Many algorithms in the CADET risk-based underkeel clearance package can be incorporated in the STS to improve its underkeel clearance predictions.

**Labs/others involved** Jacksonville District, New York District, Galveston District, IWR, Naval Surface Warfare Center, Carderock.

**Final Products** The CHL Ship/Tow Simulator will more accurately simulate response to waves in entrance channels. Better estimates of ship underkeel clearance requirements will result in dredging savings in entrance channels. The Corps will be able to perform reliable risk-based analysis of entrance channels.

**Point of Contact** Michael J. Briggs, 3909 Halls Ferry Rd, CEERD-HN-HH, Vicksburg, MS 39180-6199, [Michael.J.Briggs@erdc.usace.army.mil](mailto:Michael.J.Briggs@erdc.usace.army.mil)