Vessel Motion in Confined Waterways/ Enhancements to ERDC-WES Channel Analysis and Design Evaluation Tool (CADET)

Start Date: May 2005

Projected End Date: Sep 2006

POC:

POC

Problem Addressed:

The vessel motion unit is being structured to address vessel characteristics for vertical motion (notably dynamic sinkage or squat) during operation or transit within confined waterways. Existing relationships or engineering equations for prediction of squat do not perform adequately across varying hull shapes or channel conditions. Historically, virtually all such numerical models or relationships were derived from captive-towed models and recent physical modeling investigations of captive-towed and self-propelled model hulls indicates that self-propelled hulls may render more realistic portrayal of dynamic vessel vertical motion. Poor predictive methods for vessel squat often leads to significant uncertainty and error in assessment of specifications for waterway depth and possible overstatement or understatement of requirements for vessel underkeel clearance as it relates to waterway depth(s). Such error in estimation of requirements for depth can result in significant excess costs for transit channel construction.

Objective:

The scope of investigations will involve physical model testing of either 1-to-48 scale (at USACE facilities located at ERDC-WES) or 1-to-64 scale (at facilities of the U.S. Naval Academy) model vessels within varying model channel configurations and at varying speeds for measurement of actual squat. Models will be tested in both captive-towed and self-propelled modes and rendered data and information will in turn be analyzed to refine engineering guidance for waterway design, economic analysis, and algorithms for virtual simulation of vessel operations. Efforts are also tentatively planned to help implement changes and improvements to CADET (developed by the U.S. Naval Surface Warfare Center - Carderoc) to provide information compatible with procedures and guidance for economic analysis of waterway improvements.

Benefits:

Improved methods and numerical relationships for prediction of dynamic squat or hull sinkage under varying channel conditions which can be applied to both economic and engineering analysis of waterway planning and design; derivation of improved or more valid vertical motion algorithms for improvement of computerized or virtual simulation of vessel response to confined waterways; refinement of computerized systems for engineering analysis of waterway design (i.e., CADET)

Status:

In Progress

Contract Data:	Progress:	Products (Bookshelf/Toolbox):
120171, E5078	Report by Jennifer Waters, Jan 1,2005 *(4.2 MB, pdf)*	

Related Links:

Revised 15 Sep 2008