

Interactive Analysis of Squat Using Virtual Reality

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Abstract

The hydrodynamic sinkage and trim of a ship, also referred to as squat, primarily depends on speed and underkeel clearance. Further influence factors are the breadth of waterway and the riverbed form. While methods for monitoring location, orientation and vertical motion of proceeding ships based on Differential Global Positioning Systems provide high precision 3D data, underkeel clearance is commonly measured or calculated at few points of the ship. The geometry of waterways is usually generalized using average or even fixed values for water depth and breadth of waterway instead of the precise bathymetry of a riverbed.

Since 1997 the University of Applied Sciences Oldenburg/Ostfriesland/Wilhelmshaven is actively involved in squat research. In 2007 a research project on ship dynamics was initiated by the Department of Geo Information and the Department of Maritime Studies. Objectives of the project are to obtain profound knowledge about ship motion and its influencing factors, and to apply this knowledge for improving prediction of ship behavior.

As part of the research project, an application is developed in order to support analysis of precise measuring data about proceeding vessels within a virtual environment. First of all a dynamical 3D model of full scale measurements of ship motions is generated together with a high resolution riverbed model. Using virtual reality for visualization, the user has complete freedom to navigate and explore the virtual world. Further on spatial analysis features enable the user to investigate ship motions interactively in a dynamical scene. First results are presented in the paper.