

A Numerical Approach to Control the Load Out and Float Over Procedures of Barges

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Abstract

Numerically control of load out and float over procedures of barges is focused. In this regard, a suitable simulator is considered while a complex digital controller is proposed to control the barge perfectly during the mentioned procedures. The simulation model is based on a linear 3 DOF steady state dynamics comprising trim, heel and draft as degrees of freedom, while some corrections and assumptions are proposed to optimize the precision of model and as a result, they make it nonlinear and difficult to control perfectly. The control strategy is based on some error decreasing loops that should be calculated in each proceeding step and each section of control strategy. While these loops are to be computed before operating of each step, some error based control parts are added to the software controller to remove practical errors during the operation. This control procedure should be quick enough to operate in real time conditions, so a rapid central microprocessor is needed. Also, a mechanical strength calculator function is presented to ensure maintain in strength margins of barge. This function calculates bending moment, shear load and torsion moment of barge distributed in the barge length and return these variables and loads distribution. This functions is oriented with a simple linear dynamic with given loads distribution and 3DOF center of gravity properties.

Simulations and relevant software are adapted with barge SADRA FLB-124, which is produced in SADRA island considered to transfer and install some of the platforms of project south pars gas filed in Persian gulf. It is indicated that the theoretical results as well as practical one yield satisfactory responses. The presented software is initially written under MATLAB 6 r12 and has ability to adapt with a large variety of projects and barges with adjustable coefficients and inputs.

Key Words: Dynamic and Control of Barges, Complex Numerical Computation, Error Decreasing Control Loops, Load Out and Float Over Procedures

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