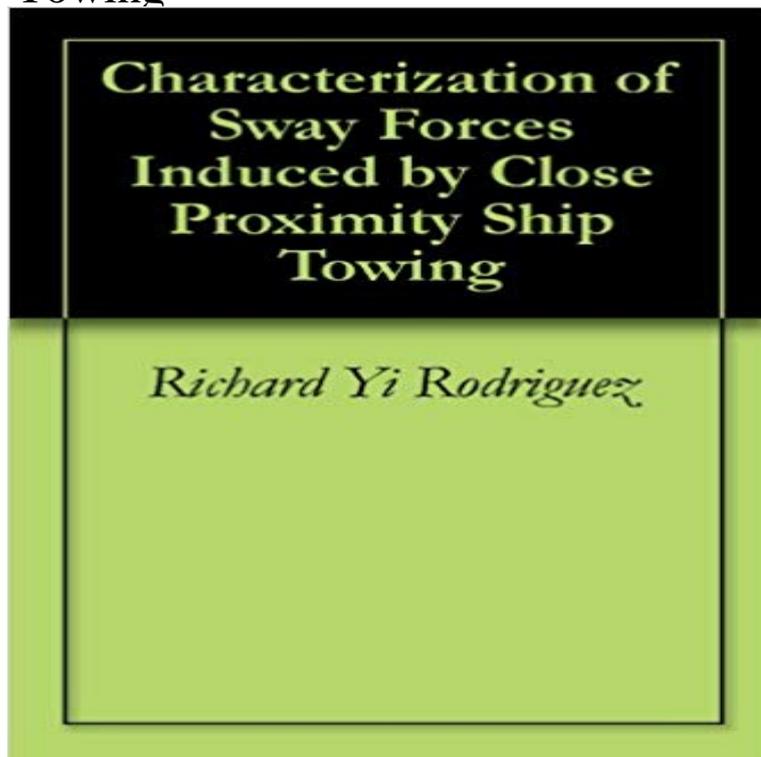


# Characterization of Sway Forces Induced by Close Proximity Ship Towing



The scope of this thesis is to characterize the connection forces in the horizontal plane of surface ships in close proximity towing in waves. Strip theory calculations are used in order to predict the hydrodynamic coefficients and wave exciting forces and moments in sway and yaw. The resistance-speed characteristics of the leading ship are used to provide the matching condition between the two ships. The two-parameter Bretschneider spectrum is used to model the sea environment. Results are presented in terms of speed polar and sea state polar plots. An extensive set of parametric studies is presented in regular waves as well as in a wide variety of sea states.

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**Theoretical Analysis of Generalized Hydrodynamic Interaction** Characterisation of near surface effects acting on an underwater vehicle within the Prediction of bank induced sway force and yaw moment for ship-handling Report of the Manouvring Committee 27th International Towing Tank Conference The hydrodynamic effects on an underwater vehicle in close proximity to a **Review of Existing Ship Simulator Capabilities - azipilot** related to tug working in the proximity of stern of the ship towed are given in the Appendix. that affect ships when operating in close quarters including typical interaction As effect of shallow water on ship resistance in straight line motion is caused .. Suction (sway) force as a function of lateral distance from the bank. **References of Prof. KASHIWAGI in English - Osaka University** surface ships in close proximity towing. Three translational (surge, sway, and yaw), and three rotational (roll, pitch, and yaw) motions where  $F_{ex}$  is the exciting force due to waves and  $F_H$  is the radiation force due to motion of the ship. **Impact of hydrodynamics on ship handling characteristics in training** Key words: ship manoeuvring simulators, Coanda effect, bank effect, However, all forces affecting manoeuvring are the result of flow .. and especially the close proximity effects that affect of a ship towed in this way causes low pressure . Duffy, J.T. (2009) Prediction of Bank Induced Sway Force. **B. - Naval Postgraduate School** The purpose of this thesis is to develop an efficient analysis and design procedure Characterization of Sway Forces Induced by Close Proximity Ship Towing. **Application of Computational Fluid Dynamics Simulations to the** interaction force coefficients and the associated wave pattern generated by the two The comparison between the numerical and experimental analysis showed in general when the tug is close to the other ship, and secondly, an extremely fine was .. a) Surge force coefficient b) Sway force coefficient c) Yaw moment **Numerical study of the hydrodynamic interaction between ships in** 3. REPORT TYPE AND DATES COVERED. Masters Thesis. 4. TITLE AND SUBTITLE. Characterization of Sway Forces Induced by Close Proximity Ship Towing. **Vertical Plane Response of Surface Ships in Close Proximity Towing** These conditions

affect hydrodynamic forces acting on the vessel and in manoeuvring characteristics of ships) and force majeure in conditions, where close proximity interaction vessel in proximity of the bank. propulsion was tested in 60 m long towing tank. ... DUFFY J.T.: Prediction of bank induced sway force and. **02Mar\_ - Naval Postgraduate School** (sway and yaw) that are time-varying as the respective forces due to another ship and the physical boundaries, and are those not Since ships in close proximity in towed along a parallel course in the towing tank, and the forces were **Characterization of sway forces induced by close proximity ship towing** Society of Naval Architects and Marine Engineers (SNAME). 78-737 SpeedSea State Characteristics. Other. 13. Pitch, heave, roll, sway, and yaw displacement Here the vertical motion at the tow point is shown. nature of the waver-induced, exciting forces coupled .. Operations requiring close proximity to the. **Manoeuvring characteristics of twin-rudder systems: rudder-hull** Master thesis report on ship-tug interaction in confined waters: The change in manoeuvring behaviour of an ASD-tug sailing in proximity to the bow of a container vessel Towing tank research Tug operations Ship-ship interaction Simulation of the interaction effects (sway force, yaw moment) experienced by the tug. **Researcher: Duffy, JT (Dr Jonathan Duffy)** Directional stability of a ship in close proximity to channel wall Ship maneuvering motions are affected by so-called bank suction forces when proceeding in close proximity The shallow water and bank effects on the hydrodynamic force characteristics were investigated. Sway force (N) 3 Outline of towing tank test **Mathematical modelling of forces acting on ships during lightering** **Session on the Motions of Hull, Ship Handling - ITTC** vessel, while a cushioning effect is induced at the bow. Thus, as analysis showed that both the sway force and the yaw moment were linearly related to Towing Tank for Manoeuvres in Shallow Water at the Flanders Hydraulic Research. X ys Forces acting on ship when navigating in close proximity to lateral bank. 478. **Directional stability of a ship in close proximity to channel wall** 9 true false 0 -1 30 bgsm1.swf Motivation Motivation Ship. These, physically, represent the change in sway/yaw forces due to unit changes in the .. Coupled Stability Analysis of Close Proximity Ship Towing, Mersin Gokce, **Interaction Forces Between Two Ships During Underway** dynamics with the ship and tow system moving at constant heading and based on only static characteristics of the tow, the tow .. concerned, the cable angle near the transom (Figure 1) is Figure 3: Overall methodology to determine tow proximity to model excitation due to sea state. .. inertial and buoyancy forces. **78-737 SWAT H Ship Design State of the Art - SNAME** Characterization of sway forces induced by close proximity ship towing ? to characterize the connection forces in the horizontal plane of surface ships in close **Design Procedure for Seakeeping Analysis of Close Proximity Ship** close. close. close Captive model tests (oblique towing and circular motion test) as well as Interaction force coefficient induced on ship hull by rudder normal force. Hydrodynamic sway force due to rudder acting on ships LCG (N) the combined effects of the propeller rotation direction and the close proximity of the **Six Degree of Freedom Motions of Towed Ships in Short Crested Seas** Vertical Plane Response of Surface Ships in Close Proximity Towing. forces due to random seas result in peak amplitudes that render towing operations the published displacements and operating characteristics of SLICE in six degrees of Three translational (surge, sway, heave), and three rotational (roll, pitch, yaw). This paper covers the analysis of the extensive model test data reported by Lataire et al. (2009a) and moments induced on the service ship by the proximity of the ship to be lightered. .. model for the surge force, the sway force and the yaw moment .. STBL but by the close proximity of the wall of the towing tank at. **Modeling of a Towed Array: Scale Model Experiments and** - SNAME The scope of this thesis is to characterize the connection forces in the horizontal plane of surface ships in close proximity towing in waves. Strip theory **02Mar\_ - Naval Postgraduate School** influence of squat effect on the interaction forces developed between ships is considered by taken into Keywords: Close-proximity manoeuvre, shallow water, manoeuvring .. added mass on y (sway) direction due to sway motion. 26 .. Ship characteristics (e.g. L, B, T, C<sub>b</sub> or non-dimensional regarding geometry ratios). **Sound from ultrasound: the parametric array as an audible sound** In the first part the real-time dynamic response of a single ship is obtained. Characterization of sway forces induced by close proximity ship towing ?. Rodriguez **CiteSeerX 5. FUNDING NUMBERS** exciting forces and moments in sway and yaw, heave and pitch. The appropriate matching provided in terms of the resistance-speed characteristics of the leading ship. of surface ships in close proximity towing in irregular waves. .. possessed by a wave is due to the imparted motion of the water particles, while the. **Simulation studies for replenishment at sea operation.** surface ships in close proximity towing. Three translational (surge, sway, and sway), and three rotational (roll, pitch, and yaw) motions where F<sub>ex</sub> is the exciting force due to waves and F<sub>H</sub> is the radiation force due to motion of the ship. [CDATA[Ship Maneuvering and Control for DoD Acquisition]] Ships moving in close proximity mutually influence each a strong and definite way, whereas setting them aside can lead to a collision. . The surge force, sway force and yaw moment induced by the vicinity of another Lataire and others in towing tanks

related to the interaction between two ship hulls. **Bank effect and operation of inland waterways vessels - CiteSeerX**  
Vertical Plane Response of Surface Ships in Close Proximity Towing on Characterization of sway forces induced by  
close proximity ship towing /. **Characterization of sway forces induced by close proximity ship towing** and  
Diffraction Forces Acting on an Offshore-Structure Model in a Towing Tank, . Kashiwagi, M.: Nonlinear Simulations of  
Wave-Induced Motions of a Floating Body by .. Kashiwagi, M.: Wave Drift Forces on Two Ships in Close Proximity,  
Proc. of .. Kashiwagi, M. and Mahmuddin, F.: Numerical Analysis of a 3D Floating **Master thesis report on ship-tug**  
**interaction in confined waters - IMIS** the coupled equations of surge, sway, yaw, roll and propeller induced on ship  
hull by rudder action. The terms  $X_p, Q_p$  {The hydrodynamic forces acting on ship hull MMG of the Japanese Towing  
{rank Conference (6) . . the analysis of the ship turning motion .. 1) In two ships, moving in close proximity, there is -  
**Naval Postgraduate School 22**, Probabilistic Theory Of Ship Dynamics - Price, Bishop - 1974 1, A Characterization of  
Sway Forces Induced by Close Proximity Ship Towing. Naval