

Abstract

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Effect of ship hull modification on seakeeping qualities: Ship fitted sponsons

Ship Conversion is a process where it includes alterations of the main ship dimensions (length, beam and depth) either to accommodate more cargo, reduce draft to change the ship's functionality as a whole. The assessment of seakeeping qualities after a conversion process is very important, since they influence the ship's hull stresses, fatigue, forces on cargo and lashings, increase in resistance due to waves, and human comfort criteria of both passengers and crew. A case study was investigated in which a RoRo/Passenger Ship has undergone a conversion process by attaching side buoyancy boxes 1m wide in order to increase its deadweight. A geometrical model was generated for 2 cases before and after conversion, this model was then assessed regarding seakeeping parameters like response amplitude operators, motions, accelerations, motion sickness incidence, slamming probability and wave added resistance. A numerical investigation of these parameters was carried out using a seakeeping analysis commercial software based on panel method (diffraction radiation theory) , subjecting both models to different wave headings and heights. The results showed an enhancement in some parameters like motion sickness incidence by 5%, vertical accelerations levels never exceeded the 8 hours' exposure limit and have been enhanced, the attached sponsons lead to an increase in added resistance with some major values in beam waves. Heave and yaw motions, velocities and accelerations show a decrease in their values while beam waves of 5 m height seem to have a disadvantage of increased values of other motions as a whole.