

Abstracts of Australasian PhD theses

The effect of beam seas on a stationary ship in shallow water

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The ultimate result of this thesis is a procedure by which estimates can be made of some of the forces on a stationary ship in shallow water due to the impact of waves. This procedure consists of numerical solution of two distinct boundary value problems (designated as the inner and outer problems) which are linked in the overall scheme by a matching process.

Part 1 consists of a study of a class of problems similar to the outer problem, which is a ribbon diffraction problem strictly analogous to similar problems in acoustics or optics. Chapters 1 and 2 discuss an efficient numerical procedure which solves this type of problem when there is a Dirichlet or Neumann boundary condition on the ribbon. This procedure is extended in Chapter 3 to allow for a mixed boundary value problem directly applicable to the ship hydrodynamics problem to be solved.

Part 2 contains two different approaches to solving the inner problem. Chapter 4 describes an accurate numerical procedure for solving this problem in a general context, whereas Chapter 5 describes some methods which enable convenient asymptotic estimates of the solution to be made in certain cases where the clearance under the ship is small.

Finally, Part 3 discusses the general ship hydrodynamics problem, shows how the methods of Part 1 and 2 are linked by a matching process, and makes some sample calculations of force coefficients for a particular ship.

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