

UNIVERSITY COLLEGE LONDON

POST GRADUATE PROJECTS

1994-95

NAVAL ARCHITECTURE

Architectural analysis of a Trimaran frigate with particular reference to its survivability

by LIEUTENANT L.M.R. CAROLA, Portuguese Navy

The vulnerability of the moving and fighting capabilities of a trimaran frigate were investigated for different types of weapon attacks. Advantages and disadvantages of different arrangements on the areas of propulsion, vital spaces and zoning are discussed. The trimaran configuration shows advantages for reduction of vulnerability in terms of:

- Propulsion and steering capabilities
- Protection of vital spaces
- Separation of passages and system runs
- Facility on supporting more armour protection.

Investigation of a 'Safe for Life' design and inspection regime for submarine primary structure

by M.D. HARVEY, MoD UK

Due to uncertainty about the influence of weld defects and shell corrosion on the structural integrity of a submarine pressure hull, the Royal Navy uses a hull surveillance policy in order to certify that a pressure hull is fit for service. Such surveillance programmes are costly and time consuming. A 'Safe for Life' pressure hull would greatly reduce the cost of ownership of the submarine fleet. This report investigates the effect of weld defects on pressure hull collapse, crack growth rates, NDE techniques and the effect of shell plate corrosion on pressure hull collapse.

Probabilistic approach to damage stability

by Miss A.E.R. HOCKING, MoD UK

The probabilistic approach to damage stability is the newest and most innovative method of stability analysis adopted to date. In recent years there has been a growing trend towards the adoption of probabilistic approaches in engineering in order to minimize risk and over engineering. This report investigates the new probabilistic approach to damage stability as contained within current regulations.

On the buckling and post buckling under uniaxial loads of steel plates used in ships and marine structures including corrosion effects.

by LIEUTENANT A.F.S.R. MATEUS, Portuguese Navy

This report contains the description and results of an investigation made on the buckling and post buckling behaviour of plates used in ship and marine structures, using a non-linear finite program. The effects of general corrosion were also introduced in the finite element models using the uniform thickness reduction approach and a new proposed quasi-random thickness surface model. The results obtained from the analysis of uncorroded plates validated the use of the non-linear finite element models. The results obtained for the corroded plate models showed that there are significant discrepancies in the prediction of plate post-buckling behaviour between the two

general corrosion approaches. This confirms that the uniform thickness reduction approach for compressive strength predictions produces optimistic results and therefore is inadequate for design purposes.

Trimaran structural design

by N. PUTNAM, Private student UK

The aim of this project has been to develop the structure for an existing trimaran concept design and in the process to note those areas which have proved significant to the structural weight. Although the final weight fraction may prove of use for future designs, it is not the intention of this report to propose a value for all trimarans.

Numerical calculation of wave making resistance on a Trimaran

by H.L. SOH, Private student Singapore

A computer program is developed for evaluating the wave making resistance of monohull and multihull vessels. The numerical method is based on the thin ship approximation which replaces the exact free surface boundary conditions with a linearized one and the boundary condition on the ship surface by one on the centre plane. The program has been written using the FORTRAN and data from 'Table of Offset' is used to define the ship.

An investigation of Trimaran structural efficiency

by A.L.L.W. SPRAGG, MoD UK

This report details a study into the structural efficiency of the trimaran hull form. This project involved finite element analysis research into the contribution of the trimaran structural box to the ship's longitudinal strength. The I-DEAS engineering, design and simulation package was used for this investigation.

To assess and propose new manoeuvrability criteria for surface ships

by A.J. WHATLEY, MoD UK

For this report a review of current manoeuvrability criteria was undertaken together with a computer program written to predict manoeuvring performance at the design stage. Also a simple operational analysis was undertaken using the manoeuvring prediction program to produce specific manoeuvring criteria.
