

UNIVERSITY COLLEGE LONDON POST-GRADUATE PROJECTS 1991/1992

MARINE ENGINEERING AND NAVAL ARCHITECTURE

Summaries of the projects on the 1991-92 MSc courses at University College London are given below. The full reports are held at the University and further information may be obtained from the Professor of Naval Architecture, Naval Architecture and Marine Engineering Office, Department of Mechanical Engineering, University College London, Torrington Place, London WC1E 7JE.

NAVAL ARCHITECTURE

An Investigation of Arctic Capable SSK Submarines
by Lt (N) G. R. Best, MSc, Canadian Forces

This report presents a discussion of the operational environment, stability and structural considerations relative to SSK submarines designed to operate under ice for prolonged periods including occasional through-ice surfacings.

Trimaran Stability—A Criteria Review

by Lt (N) C. J. P. Cole, MSc, Canadian Forces

The aim of this report is to propose a philosophy from which stability criteria for trimarans may be developed. At present the trimaran as a military vessel is in the infant design stages.

Resistance of Trimarans

by A. R. Cudmore, MSc, U.K. MOD

The aim of this report is to determine the effect of the side hulls on the resistance of a trimaran. A scale model of an advanced frigate was towed in the circulating water channel at DRA Haslar. The model used allowed the position of the side hulls to vary both transversely and longitudinally. The results obtained show there was an interference effect on the resistance at all the speed and side hull positions that were investigated.

Design Features of Future Aircraft Carrier Designs

by S. D. Machin, MSc, U.K. MOD

This report investigates the aircraft carrying capacity of small aircraft carriers. A number of different characteristics, including the use of deck parks, different aircraft types, varying access and maintenance policies were examined. These investigations were all carried out on a baseline 10,000 ton light aircraft carrier that had been produced to a given set of requirements.

Finite Element Analysis of SWATH Bulkheads

by Lt. K. Mahmood, MSc, Pakistan Navy

A SWATH structure is subjected to non-uniform stress distribution and shear. The classical beam theory is not applicable in describing the state of stress in SWATH ships. A finite element analysis was, therefore, required to describe the structural response adequately.

The Relative Merits of Devices to Enhance Propulsive Efficiency

by S. A. Marshall, MSc, U.K. MOD

This report describes the devices currently available or in development that enhance the propulsive efficiency of ships. Comparisons are made between devices and combinations of devices with regard to the propulsive efficiency gains that can be expected together with the installation costs.

Forecasting of Ship Motions

by Lt. C. A. L. Moreira, MSc, Portuguese Navy

This report develops on-line forecasting techniques based on SI models which are then used to forecast statistical parameters such as maxima and mean vertical accelerations. ARMA, ARIMA and Kalman Filter were the SI models used which were established from previously measured data. This work seeks to demonstrate that the above forecasting techniques are potentially useful tools to assist the decision-making process during marine operations.

A Direct Approach to Computer Modelling of Ship Sectional Added Mass and Damping

by S. Pearson, MSc, U.K. MOD

The report examines theoretically the 'Direct Approach' to fluid modelling by computer. This technique allows the component pressures of a fluid to be examined and hence reveals the physics of fluid behaviour. This contrasts with many of the mainstream approaches in which the physics is often masked by the associated complicated mathematical solution techniques.

Trimaran Design Program

by P. M. H. Redhead, MSc, U.K. MOD

The report describes the geometry of trimarans and proposes a design procedure which can be adopted for the initial sizing of trimarans. The iterative procedure required to achieve a design balance involves adopting a strategy in order to converge on a single solution, and although a strategy is proposed further work is required to establish its validity.

SWATH Stability at Large Angles

by Lt. J. Rentroia, MSc, Portuguese Navy

This report is on the assessment of SWATH ships stability at large angles. Two major computer programs developed for the UK and USA military, respectively 'GODESS' and 'ASSET' were used to assess the stability of SWATH ships at large angles. Some observations were made regarding the adequacy of current criteria as applied to this type of vessel.

Trireme Oar System Test Vehicle

by G. Rudgey, MSc, U.K. MOD

This report outlines the design of a trireme oar system test vehicle. The test vehicle is powered by twelve oarsmen located six on either side of an aluminium box section framework. The framework is then mounted on a catamaran consisting of two strengthened rowing eight hulls. All major naval architecture aspects are covered including structure, hull form, hydrostatics, stability, resistance and propulsion.

Development of a Computer Program for Initial Sizing of Submarines

by Kapitanleutnant W. Schild, MSc, Federal German Navy

This report sets out to develop an iterative initial sizing process for submarines which converges to a minimum solution in terms of volume and weight for any given design specification.

Design of Supercavitating Propellers

by J. Weitzenbock, MSc

This report seeks to show the development of a computer program which will assist in the design of supercavitating propellers. It will aid in the preliminary design of propellers and performance prediction.

MARINE ENGINEERING (MECHANICAL)

Vessel Motion Prediction

by C. Gailas, MSc

This report deals with the investigation and analysis of the dynamic effects of regular waves on floating vessels with zero forward velocity. Model vessels were used in the investigation and were subjected to a range of wave frequencies.

Kinematic and Dynamic Analysis of Ships' Steering Gear

by M. G. Jordaan, MSc

The purpose of this report is to investigate the effect of the sea and waves on the steering gear of a ship. The report covers the initial stages of consideration of two important aspects which will assist in improving understanding of steering gear operation and modes of failure:

- (a) Computer graphic modelling of a steering gear system showing movements and possible causes of failures.
- (b) Mathematical modelling of the hydraulic and mechanical components making up the complete steering gear system.

A Computer Program for the Calculation of the Heat Released in an Internal Combustion Engine

by G. A. Livanos, MSc

This project discusses the development of a computer program which calculates the heat released in the cylinder of an internal combustion engine from its cylinder characteristics.

Design of a Test Rig to Characterize Diesel Sprays

by K. F. Mak, MSc

This report suggests a design for a test rig comprising a test chamber, a fuel supply system and optical access for instrumentation to characterize diesel sprays.

MARINE ENGINEERING (ELECTRICAL)

Frigate Heave Motion Prediction

by M. R. Zamudio, MSc

The aim of this project is to use motion data collected from on board a Type 22 frigate and to develop a suitable model in order to predict the heave component of the ship over a prediction horizon of 10 secs. These predicted heave motions are then compared against a certain threshold, enabling the prediction of safe/unsafe helicopter operations.
