

Preface

This book elaborates on theoretical approaches and practices of the preliminary design of ships. It is intended to support introductory courses to ship design as a text book. In this respect, it may be useful to university or college students of naval architecture and related disciplines; it may also serve, more generally, as a reference book for naval architects, practicing engineers of related disciplines and ship officers, who like to enter the ship design field systematically or to use practical methodologies for the estimation of ship's main dimensions and of other ship main properties and elements of ship design.

The book is based on the author's lecture notes, which were developed over the past two and a half decades (1985–2012) for the needs of teaching the undergraduate course on *Ship Design and Outfitting I* at the School of Naval Architecture and Marine Engineering of National Technical University of Athens (NTUA). For the understanding of the material presented in this book, the reader is assumed to have basic knowledge of certain fundamental disciplines of ship design, in particular, of “Hydrostatics & Stability of Ships”, “Ship Resistance and Propulsion” and “Ship Strength”, which are commonly taught in prerequisite courses in Schools of Naval Architecture and Marine Engineering, as at NTUA.

The present book is a thoroughly updated and enhanced, new edition of a book published originally in Greek language by the author (*Papanikolaou, A., Ship Design—Methodologies of Preliminary Ship Design*, in Greek: Μελέτη Πλοίου—Μεθοδολογίες Προμελέτης Πλοίου, SYMEON Publisher, Athens, October 2009). The Greek version of the book is supplemented by a *Handbook of Ship Design* of the author (Volume II, SYMEON Publisher, Athens, 1989) and the *Collection of Ship Design Supportive Materials* (*A. Papanikolaou, K. Anastassopoulos*, NTUA publications, Athens, 2002), which cover specific elements, methods and examples of application of ship design and are being used by students of NTUA for the elaboration of the assigned *Ship Design Project* work. Elements of the detailed design of ships are presented in the author's lecture notes on *Ship Design and Outfitting II—General Arrangements, Accommodation, Outfitting and Design of Special Ship Types* (*A. Papanikolaou*, NTUA publication, 2002), which supplement the teaching material of the Ship Design module of the School of Naval Architecture and Marine Engineering of NTUA.

The methodology adopted in the writing of this book has been greatly influenced by the teaching experience of the author and the curriculum of NTUA, particularly in view of the requirement for the elaboration of the “Ship Design project” by final year NTUA students of naval architecture. An inexperienced student needs to be introduced gradually to ship design, until he is capable of developing by himself (under certain guidance, in the preliminary design stage) the design of a ship, which is assigned to him by a hypothetical ship-owner, specifying a merchant ship’s main owner’s requirements (in terms of ship type, transport capacity and speed).

The book consists of six (6) main chapters and five (5) appendices with supportive materials.

Chapter 1 gives an introduction to maritime transport and to marine vehicles in general, defines the objectives and elaborates on the basic methods of ship design. Chapter 2 deals with the selection of ship’s main dimensions and elaborates on the preliminary calculation and approximation of the fundamental characteristics and properties of the ship. Chapter 3 covers the criteria of forming ship’s hull form and elaborates on the characteristics of alternative ship sectional forms, the form of ship’s bow and stern. Chapter 4 deals with methods of developing ship’s lines and also elaborates on the development of the other main drawing plans of ship design (general arrangements and capacity plan). Chapter 5 covers the criteria for selecting the engine installation, the propulsion plant and steering devices of the ship. Finally, Chapter 6 deals with the estimation of ship’s construction cost and related uncertainties. The book is complemented by a basic bibliography and five appendices with useful updated design charts for the selection of the main dimensions and other basic values of different types of ships (Appendix A), the determination of ship’s hull form from the data of systematic series (Appendix B), the detailed description of the relational method for the estimation of ship’s weight components and displacement from the data of similar/parent ships (Appendix C), a brief review of the historical evolution of shipbuilding from the prehistoric era to date (Appendix D) and finally a historical review of regulatory developments of ship’s damage stability to date (Appendix E).

The author used in the development of the original form of this book material of *classical* ship design, as he was taught it in the early 70ties by the memorable Professor *Erwin Strohmusch* at the Technical University of Berlin. This material was later complemented by valuable elements from the lecture notes of Professors *H. Schneekluth* (Technische Hochschule Aachen) and *H. Linde* (Technical University of Berlin), who happened to be both also students and associates of the late Prof. *Strohmusch*, and *A. Friis—P. Anderson—JJ Jensen* (Technical University of Denmark). Also, the classical naval architectural books of the Society of Naval Architects and Marine Engineers (SNAME) of USA, namely *The Principles of Naval Architecture* (*EV Lewis*, ed.) and *Ship Design and Construction* (*R Taggart* and *T Lamb*, eds.), were frequently used as references. However, the synthetic nature of the subject, the rapid developments of shipbuilding science and technology, the frequent amendment of relevant maritime safety regulations and the rapid development of modern design methods and tools, which to a large extent were coded in specialized computer software, as well as the peculiarity of educating students in a

synthetic discipline like ship design demanded a thoroughly thought new structure/presentation of the book's material, apart from the continuous enrichment with contemporary design data.

A major objective of this book and of the associated supportive material is to cover, as a self-contained information source, the necessary knowledge for students of naval architecture to approach satisfactorily a ship design project. To some extent, this applies also to young professionals of naval architecture and related disciplines, for whom the access to the necessary technical knowledge and required data for the study and design of a ship are often limited. Certainly, the rapid growth of internet in recent years has improved significantly the accessibility to a large amount of information relevant to the design of ships by search in the www.

A useful State of the Art report on the status of the international marine design education can be found in the following reference: *Papanikolaou, A., Kaklis, P., Andersen, P., Birmingham, R., Sortland, B., Wright, P.*, State of the Art Report on Marine Design Education, Proc. 9th International Marine Design Conference-IMDC06, Ann Arbor-Michigan, May 2006.

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