

a second volume, which permits the reader to refer to an illustration while reading its descriptive text.

The book fills a different purpose from *Marine Engineering* (SNAME, 1992) which concentrates more on design. It is also a less extensive operations book than *Modern Marine Engineer's Manual* (Cornell Maritime Press 1999, 2002).

The authors of this book have taught the students at whom the book is aimed. Much information has come from their class notes. No doubt, they have tailored the contents to meet their expectation of course content. They have given exhaustive treatment to steam turbines and boilers and to diesels. There is also a good chapter on gas turbines. The subject of electric propulsion is limited but with many new ships being built with electric drive, it would have been improved with a separate chapter on electrical propulsion including motors, speed control, and propulsion pods. The chapter on nuclear propulsion is curious in but apparently necessary.

Where diagrams and drawings have been produced specifically for this book, they tend to be extremely clear and concise. Piping system diagrams contain the information essential to understanding the system without excessive detail. However, some of the illustrations are poorly reproduced, which is said to account for the book's current "pre-publication" format. This issue is mainly the case with photos and diagrams that have been extracted from other books and machinery technical manuals. This issue is noted in the preface of the book, which advises that the figures will be cleaned up before the final publication. Plans for final publication are in progress, according to SNAME. An instructor's version of the book will be issued later this year in electronic format on CD.

On the whole, *Introduction to Practical Marine Engineering* fills a niche in the education of future seagoing marine engineers and deck officers. It could be improved by some re-balancing of the content toward current trends and technology in the industry. It would also benefit from final publication in a more polished format.

SHIP HYDROSTATICS AND STABILITY

Adrian Biran

Review by Mr. Michael R. Ales, PE

Those educators looking for an up to date introductory naval architecture textbook would do well to consider Adrian Biran's new work, *Ship Hydrostatics and Stability*. Based upon a quarter century of teaching ship hydrostatics at the Technion-Israel Institute of Technology, the text provides a comprehensive overview of the topic, including the concept of parametric resonance (the Mathieu effect) and its application to intact ship stability criteria. The use of personal computers and the new regulations for intact and damaged stability are also discussed. A selection of MATLAB program files for hydrostatic and stability calculations are available for download for student use.

The authors have made the text useful to students in a number of ways. The first time a term is used in the text, it is presented in boldface. Translations into French, German, and Italian of common terminology are also provided. An ample number of diagrams, graphs, and examples are provided to aid in understanding the concepts as they are presented. The text does presume a working knowledge of integral calculus and differential equations, which will make some portions of the text difficult to follow for those students without the requisite background. The text uses S.I. units throughout the book, so familiarity with metric units is also a must. The summary section at the end of each chapter is helpful as a study aid.

Definitions are the first topic area covered, followed a comprehensive exposition on the basics of ship hydrostatics. At the end of each chapter of the book are example problems, followed by exercises that can be assigned as homework problems. Numerical integration and the development of hydrostatic curves are then discussed. The next few chapters discuss simple models of stability based on first principles, including the concepts of static stability, heeling arms, and dynamical stability. Weight and trim calculations are then explained, including

a thorough description of inclining experiments.

The highlight of the text is its coverage of intact stability regulations. It succinctly explains the IMO code, U.S. Navy regulations, U.K. Navy regulations, U.K. sail vessel criteria, the U.K. code for small workboats and pilot boats, and German Federal Navy regulations. The reduction of the ship's righting arm in head or following seas when on a crest of a wave, and the resulting possibility of capsizing due to parametric resonance, is discussed in great detail. The explanation of how the effect of parametric resonance is accounted for and to a great extent mitigated in the German Federal Navy regulations provides students an insight into how standards are developed.

Damaged stability is the next topic covered in the text. In addition to a discussion based on first principles, SOLAS regulations, U.S. Navy regulations, U.K. Navy regulations, German Federal Navy, U.K. merchant vessel code, and several other minor codes are covered. Linear ship response in waves and the use of various types of roll stabilization are the next subjects discussed. The text concludes with a survey of the effect the introduction of digital computing has had on naval architecture calculations. Bézier curves, non-uniform rational B-splines (NURBS), and parametric surfaces are explained, followed by an excellent discussion on how these tools are used in the hull modeling programs MultiSurf and SurfaceWorks to define the shape of a ship's hull and to conduct hydrostatic calculations. The section finishes with an explanation of the simulation of ship motions in waves based on the mathematical models previously discussed.

There are extensive references, both historical and technical, included in the text throughout the book. The bibliography is comprehensive and an outstanding reference for those students who want to delve deeper into a particular topic. This work deserves consideration as a basic text for use in any undergraduate naval architecture curriculum.