Book review

MARINE PROPELLERS AND PROPULSION, 2ND EDITION

John Carlton. Elsevier, Oxford, 2007, ISBN 978-07506-8150-6, £125.00, 560 pp.

This book provides a comprehensive and in-depth guide to the subject of marine propellers and propulsion. It is aimed mainly at practising marine engineers and naval architects but the material it contains will also be of interest to researchers in the field, and the book would be invaluable to the serious student of the subject. It takes the design of propellers as the main topic but, by treating many of the issues which influence propeller design in some depth, it is also an effective general reference on the hydrodynamic aspects of ship powering performance. This is the second edition, updating the first edition which was published in 1994.

The author develops the subject from a historical perspective, giving an account of early development in the field and the subsequent key developments leading up to the present time. By giving comprehensive details of the significant developments over time the reader gains a better understanding of the physics and the validity of the theories involved. There is also significant emphasis on not only the theory but also the practical aspects of determining performance; so, for example, details of both model and full-size test and measurement methods are discussed. Descriptions of the background and development of significant formulae are supported by tables and figures which have been extracted from key sources, thereby making the book a working reference that is backed up by a comprehensive list of references.

The book is split into 26 chapters and covers propulsion systems, propeller geometry, the propeller environment, the wake field, propeller performance characteristics, theoretical methods – basic concepts and propeller theories, cavitation, propeller noise, propeller–ship interaction, ship resistance and propulsion, thrust augmentation devices, transverse thrusters, azimuthing and podded propulsors, waterjet propulsion, full-scale trials, propeller materials, propeller blade strength, propeller manufacture,

propeller blade vibration, propeller design, operational problems, service performance and analysis, propeller tolerances and inspection, and finally, propeller maintenance and repair.

Each of these chapters covers their respective topic in some depth. So, for example, the chapter on propeller performance characteristics covers the traditional topics of open water characteristics, the presentation of these as B_p - δ and μ - δ diagrams, the effect of cavitation on efficiency, propeller scale effect, a range of standard series data and their use (Wageningen B-screw, Gawn and others), ducted propellers, performance in off design conditions, slip-stream contraction and finally, behind propeller characteristics. Some of the other chapters are, however, more theoretically based with propeller theories from the momentum to computational fluid dynamics methods covered.

With the increasing emphasis on improving ship powering performance, the chapters on service performance and analysis and thrust-enhancing devices are topical, the chapter on thrust-enhancing devices giving a good overview of the technologies available, some of which can be fitted as retrofit devices but others that are only suitable for new builds. The chapter on service performance and analysis details the effect of hull and blade roughness on ship performance and covers the determination of the actual ship performance from in-service data.

In summary, the book is comprehensive and informative. It may be too detailed for those who are looking for an overview of the issues involved, but for the intended audience of practitioners and researchers this will be an invaluable reference. The range of items covered means that this book will be of interest even to experienced workers in the field whose knowledge may not encompass the entire area covered. The historical perspective combined with an excellent list of up-to-date references means that this book acts as a ready and authoritative index into the world of propeller design.

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