Risk-Based Ship Design
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Risk-Based Ship Design

Methods, Tools and Applications

Authored by

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Preface

Risk-based ship design is a new scientific and engineering field of growing interest to researchers, engineers and professionals from various disciplines related to ship design, construction, operation and regulation. Applications of risk-based approaches in the maritime industry started in the early 1960s with the introduction of the concept of probabilistic ship’s damage stability. In the following, they were widely applied within the offshore sector and are now being adapted and utilized within the ship technology and shipping sector.

The main motivation to use risk-based approaches is twofold: implement a novel ship design which is considered safe but – for some formal reason – cannot be approved today and/or rationally optimise an existing design with respect to safety, without compromising on efficiency and performance.

The present book derives from the knowledge gained in the course of the project SAFEDOR (Design, Operation and Regulation for Safety), an Integrated Project under the 6th framework programme of the European Commission (IP 516278). The topic of SAFEDOR is risk-based ship design, operation and regulation. The project started in February 2005 and will be completed in April 2009. Under the coordination of Germanischer Lloyd, 52 European organizations – representing all stakeholders of the maritime industry – took part in this important R&D project.

The present book does not aim to be a textbook for postgraduate studies, as contributions to the subject topic are still evolving and some time will be necessary until maturity. However, as the topic of risk-based design, operation and regulation is almost absent from today’s universities’ curricula, the book aims to contribute to the necessary enhancement of academic curricula to address this important subject to the maritime industry. Therefore, the aim of the book is to provide the readers with an understanding of the fundamentals and details of the integration of risk-based approaches into the ship design process. The book facilitates the transfer of knowledge from the research conducted within the SAFEDOR project to the wider maritime community and nurtures inculcation upon scientific approaches dealing with risk-based design and ship safety.

The book is introduced by an overview of risk-based approaches to the maritime industry in Chap. 1 by Dr. Pierre C. Sames (Germanischer Lloyd). The risk-based
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ship design, related concepts and a passenger ship case study, presented by Professor Dracos Vassalos (Universities of Glasgow and Strathclyde), are following in Chap. 2. The risk-based maritime regulatory framework and developments of Formal Safety Assessment are presented by Dr. Rolf Skjong (Det Norske Veritas) in Chap. 3. The risk-based approval process is outlined in Chap. 4 by Mr. Jeppe Juhl (Danish Maritime Authority). In Chap. 5, a variety of methods and tools to address critical design and operation scenarios are elaborated by Professors Jørgen Jensen (Technical University of Denmark), Carlos Guedes Soares (Instituto Superior Tecnico, Lisbon) and Apostolos Papanikolaou (National Technical University of Athens). Finally, in Chap. 6, three risk-based ship design case studies are elaborated, namely the first on the design of a lightweight composite sandwich superstructure of a RoPax ship by Mr. Dag McGeorge (Det Norske Veritas), the second on the design of an AFRAMAX oil tanker by Professor Apostolos Papanikolaou (National Technical University of Athens) and the third on the design of a fast RoPax vessel by Dr. Andrzej Jasionowski (Safety at Sea, Glasgow) and Mr. Esa Pöyliö (Deltamarin, Finland).

The target readership of this book is engineers and professionals in the maritime industry, researchers and post-graduate students of naval architecture, marine engineering and maritime transport university programs. The book closes a gap in the international literature, as no other books are known in the subject field covering comprehensively today the complex subject of risk-based ship design.

The complexity and the evolving character of the subject required the contribution from many experts active in the field. As editor of this book, I am indebted to the authors of the various book chapters reflecting their long time research in the field. Also, the contributions of the whole SAFEDOR partnership to the presented work and the funding by the European Commission (DG Research) are acknowledged. Finally, the support of Dr. Eleftheria Eliopoulou (National Technical University of Athens) in the edition of the book is acknowledged.

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