

## Buckling Of Ship Structures

Buckling and Ultimate Strength of Ship and Ship-like Floating Structures provides an integrated state-of-the-art evaluation of ship structure mechanics including buckling, plastic failure, ultimate strength, and ultimate bending moments. For the design of any industrial product, it is necessary to understand the fundamentals in the failure behavior of structures under extreme loads. Significant developments have been made in understanding the analysis method of plastic collapse and behavior and strength of structures accompanied by buckling. Written by two of the foremost experts in international ship design and ocean engineering, this book introduces fundamental theories and methods as well as new content on the behavior of buckling/plastic collapse that help explain analysis like the initial imperfections produced by welding and the ultimate strength of plates, double bottom structures of bulk carriers, and ship and FPSO hull girders in longitudinal bending. Rounding out with additional coverage on floating structures such as oil and gas platforms and LNG/FLNG structural characteristics, Buckling and Ultimate Strength of Ship and Ship-like Floating Structures is a must-have resource for naval architects and other marine engineering professionals seeking to gain an in-depth understanding of the technological developments in this area. Explains how the initial imperfections produced by welding, residual stress, and initial deflection in panels influence the collapse behavior and the compressive ultimate strength of rectangular plates Evaluates the ultimate strength of plate girders under bending and shearing as well as combined bend/shear loads Provides fundamental theories, simple formulas, and analytical methods such as Finite Element Method or Smith's Method to simulate and evaluate buckling/plastic collapse behavior and strength of plates under various conditions Authored by two of the foremost experts in international ship design and ocean engineering Includes additional coverage on floating structures such as oil and gas platforms

The Maritime Engineering Reference Book is a one-stop source for engineers involved in marine engineering and naval architecture. In this essential reference, Anthony F. Molland has brought together the work of a number of the world's leading writers in the field to create an inclusive volume for a wide audience of marine engineers, naval architects and those involved in marine operations, insurance and other related fields. Coverage ranges from the basics to more advanced topics in ship design, construction and operation. All the key areas are covered, including ship flotation and stability, ship structures, propulsion, seakeeping and maneuvering. The marine environment and maritime safety are explored as well as new technologies, such as computer aided ship design and remotely operated vehicles (ROVs). Facts, figures and data from world-leading experts makes this an invaluable ready-reference for those involved in the field of maritime engineering. Professor A.F. Molland, BSc, MSc, PhD, CEng, FRINA. is Emeritus Professor of Ship Design at the University of Southampton, UK. He has lectured ship design and operation for many years. He has carried out extensive research and published widely on ship design and various aspects of ship hydrodynamics. \* A comprehensive overview from best-selling authors including Bryan Barrass, Rawson and Tupper, and David Eyres \* Covers basic and advanced material on marine engineering and Naval Architecture topics \* Have key facts, figures and data to hand in one complete reference book

Ship Construction is a comprehensive text for students of naval architecture, ship building and construction, and for professional Naval Architects and Marine Engineers as a refresher on the latest developments in ship types, safety and shipyard practices. Beginning with an introduction to ship building and concluding with the finished product, the book enables the reader to follow the construction of a ship from start to finish. Eyres explores in depth, chapter by chapter, the development of ship types, materials and strengths of ships, welding and cutting, shipyard practice, ship structure and outfitting. The new edition includes a new chapter on computer-aided design and manufacture, and all the latest international regulations and technological developments. · Covers the complete ship construction process including the development of ship types, materials and strengths of ships, welding and cutting, shipyard practice, ship structure and outfitting · All the latest developments in technology and shipyard methods, including a new chapter on computer-aided design and manufacture · Essential for students and professionals, particularly those working in shipyards, supervising ship construction, conversion and maintenance

\* Edited by Josef Singer, the world's foremost authority on structural buckling. \* Time-saving and cost-effective design data for all structural, mechanical, and aerospace engineering researchers.

"For private circulation amongst the staff only" -- cover verso.

This book contains eight chapters treating the stability of all major areas of the flexural theory. It covers the stability of structures under mechanical and thermal loads and all areas of structural, loading and material types. The structural element may be assumed to be made of a homogeneous/isotropic material, or of a functionally graded material. Structures may experience the bifurcation phenomenon, or they may follow the postbuckling path. This volume explains all these aspects in detail. The book is self-contained and the necessary mathematical concepts and numerical methods are presented in such a way that the reader may easily follow the topics based on these basic tools. It is intended for people working or interested in areas of structural stability under mechanical and/or thermal loads. Some basic knowledge in classical mechanics and theory of elasticity is required.

Trends in the Analysis and Design of Marine Structures is a collection of the papers presented at MARSTRUCT 2019, the 7th International Conference on Marine Structures held in Dubrovnik, Croatia, 6-8 May 2019. The MARSTRUCT series of Conferences started in Glasgow, UK in 2007, the second event of the series having taken place in Lisbon, Portugal in March 2009, the third in Hamburg, Germany in March 2011, the fourth in Espoo, Finland in March 2013, the fifth in Southampton, UK in March 2015, and the sixth in

Lisbon, Portugal in May 2017. This Conference series specialises in dealing with Ships and Offshore Structures, addressing topics in the fields of: - Methods and Tools for Loads and Load Effects - Methods and Tools for Strength Assessment - Experimental Analysis of Structures - Materials and Fabrication of Structures - Methods and Tools for Structural Design and Optimisation - Structural Reliability, Safety and Environmental Protection. Trends in the Analysis and Design of Marine Structures is an essential document for academics, engineers and all professionals involved in the area of analysis and design of Ships and Offshore Structures. About the series: The 'Proceedings in Marine Technology and Ocean Engineering' series is devoted to the publication of proceedings of peer-reviewed international conferences dealing with various aspects of 'Marine Technology and Ocean Engineering'. The Series includes the proceedings of the following conferences: the International Maritime Association of the Mediterranean (IMAM) conferences, the Marine Structures (MARSTRUCT) conferences, the Renewable Energies Offshore (RENEW) conferences and the Maritime Technology (MARTECH) conferences. The 'Marine Technology and Ocean Engineering' series is also open to new conferences that cover topics on the sustainable exploration and exploitation of marine resources in various fields, such as maritime transport and ports, usage of the ocean including coastal areas, nautical activities, the exploration and exploitation of mineral resources, the protection of the marine environment and its resources, and risk analysis, safety and reliability. The aim of the series is to stimulate advanced education and training through the wide dissemination of the results of scientific research.

This book addresses various aspects of ship construction, from ship types and construction materials, to welding technologies and accuracy control. The contents of the book are logically organized and divided into twenty-one chapters. The book covers structural arrangement with longitudinal and transverse framing systems based on the service load, and explains basic structural elements like hatch side girders, hatch end beams, stringers, etc. along with structural subassemblies like floors, bulkheads, inner bottom, decks and shells. It presents in detail double bottom construction, wing tanks & duct keels, fore & aft end structures, etc., together with necessary illustrations. The midship sections of various ship types are introduced, together with structural continuity and alignment in ship structures. With regard to construction materials, the book discusses steel, aluminum alloys and fiber reinforced composites. Various methods of steel material preparation are discussed, and plate cutting and forming of plates and sections are explained. The concept of line heating for plate bending is introduced. Welding power source characteristics, metal transfer mechanisms, welding parameters and their effects on the fusion zone, weld deposit, and weld bead profile are discussed in detail. Various fusion welding methods, MMAW, GMAW, SAW, Electroslag welding and Electrogas welding and single side welding are explained in detail. Friction stir welding as one of the key methods of solid state welding as applied to aluminum alloys is also addressed. The mechanisms of residual stress formation and distortion are explained in connection with stiffened panel fabrication, with an emphasis on weld induced buckling of thin panels. Further, the basic principles of distortion prevention, in-process distortion control and mitigation techniques like heat sinking, thermo-mechanical tensioning etc. are dealt with in detail. In its final section, the book describes in detail various types of weld defects that are likely to occur, together with their causes and remedial measures. The nondestructive testing methods that are most relevant to ship construction are explained. Lastly, a chapter on accuracy control based on statistical principles is included, addressing the need for a suitable mechanism to gauge the ranges of variations so that one can quantitatively target the end product accuracy.

The study of buckling loads, which often hinges on numerical methods, is key in designing structural elements. But the need for analytical solutions in addition to numerical methods is what drove the creation of Exact Solutions for Buckling of Structural Members. It allows readers to assess the reliability and accuracy of solutions obtained by numerical methods. Discover the theory of structural stability and its applications in crucial areas in engineering Structural Stability Theory and Practice: Buckling of Columns, Beams, Plates, and Shells combines necessary information on structural stability into a single, comprehensive resource suitable for practicing engineers and students alike. Written in both US and SI units, this invaluable guide is perfect for readers within and outside of the US. Structural Stability Theory and Practice: Buckling of Columns, Beams, Plates, and Shell offers: Detailed and patiently developed mathematical derivations and thorough explanations Energy methods that are incorporated throughout the chapters Connections between theory, design specifications and solutions The latest codes and standards from the American Institute of Steel Construction (AISC), Canadian Standards Association (CSA), Australian Standards (SAA), Structural Stability Research Council (SSRC), and Eurocode 3 Solved and unsolved practice-oriented problems in every chapter, with a solutions manual for unsolved problems included for instructors Ideal for practicing professionals in civil, mechanical, and aerospace engineering, as well as upper-level undergraduates and graduate students in structural engineering courses, Structural Stability Theory and Practice: Buckling of Columns, Beams, Plates, and Shell provides readers with detailed mathematical derivations along with thorough explanations and practical examples.

Buckling of Ship Structures presents a comprehensive analysis of the buckling problem of ship structural members. A full analysis of the various types of loadings and stresses imposed on ship plating and primary and secondary structural members is given. The main causes and consequences of the buckling mode of failure of ship structure and the methods commonly used to control buckling failure are clarified. This book contains the main equations required to determine the critical buckling stresses for both ship plating and the primary and secondary stiffening structural members. The critical buckling stresses are given for ship plating subjected to the induced various types of loadings and having the most common boundary conditions encountered in ship structures. The text bridges the gap existing in most books covering the subject of buckling of ship structures in the classical analytical format, by putting the emphasis on the practical methods required to ensure safety against buckling of ship structural members. It is very useful to ship designers, shipyard engineers, naval architects, international classification societies and also to students studying naval architecture, marine engineering and offshore structures.

It is a valuable source for practicing naval architects to quickly check the possibility of buckling of ship structure members without reverting to the complex and costly analysis using advanced FEM software.

Flexural-Torsional Buckling of Structures provides an up-to-date, comprehensive treatment of flexural-torsional buckling and demonstrates how to design against this mode of failure. The author first explains the fundamentals of this type of buckling behavior and then summarizes results that will be of use to designers and researchers in either equation or graphical form. This approach makes the book an ideal text/reference for students in structural engineering as well as for practicing civil engineers, structural engineers, and constructional steel researchers and designers. The book begins by introducing the modern development of the theory of flexural-torsional buckling through discussions on the general concepts of equilibrium, total potential, virtual work, and buckling. It then continues with in-depth coverage of hand methods for solving buckling problems, the analysis of flexural-torsional buckling using the finite element method, and the buckling of different types of structural elements and frames composed of various elastic materials. Other topics addressed include the design and inelastic buckling of steel members. The book's final chapter considers a collection of special topics.

Developments in the Collision and Grounding of Ships and Offshore includes the contributions to the 8th International Conference on Collision and Grounding of Ships and Offshore Structures (ICCGS 2019, Lisbon, Portugal, 21-23 October 2019). The series of ICCGS-conferences started in 1996 in San Francisco, USA, and are organised every three years in Europe, Asia and the Americas. Developments in the Collision and Grounding of Ships and Offshore covers a wide range of topics, from the behavior of large passenger vessels in collision and grounding, collision and grounding in arctic conditions including accidental ice impact, stability residual strength and oil outflow of ships after collision or grounding, collision and grounding statistics and predictions and measures of the probability of incidents, risk assessment of collision and grounding, prediction and measures for reduction of collision and grounding, new designs for improvement of structural resistance to collisions, analysis of ultimate strength of ship structures (bulkheads, tank tops, shell etc.), design of buffer bows to reduce collision consequences, design of foreship structures of ferries with doors to avoid water ingress in case of a collision, development of rational rules for the structural design against collision and grounding, innovative navigation systems for safer sea transportation, the role of IMO, classification societies, and other regulatory bodies in developing safer ships, collision between ships and offshore structures, collision between ships and fixed or floating bridges and submerged tunnels, collision with quays and waterfront structures, collision and grounding experiments, properties of marine-use materials under impact loadings, residual strength of damaged ships and offshore structures, analysis of ultimate strength of ship structures, to human factors in collision and grounding accidents. Developments in the Collision and Grounding of Ships and Offshore is a valuable resource for academics, engineers and professionals involved in these areas.

Written by eminent researchers and renown authors of numerous publications in the buckling structures field. \* Deals with experimental investigation in the industry. \* Covers the conventional and more unconventional methods for testing for a wide variety of structures. \* Various parameters which may influence the test results are systemically highlighted including, imperfections, boundary conditions, loading conditions as well as the effects of holes and cut-outs.

Stop searching through the endless amount of literature to find the most recent information on plate buckling. The authors of Handbook of Thin Plate Buckling and Post Buckling have already done the work for you. Detailed and clearly written, the book contains a comprehensive, up-to-date treatment of the buckling and postbuckling behavior of perfect and imperfect thin plates. The authors study, in detail and with specific solved examples, the essential factors that influence critical buckling loads, initial mode shapes, and postbuckling behavior for thin plates. Through their analysis of rectangular, circular, and annular plates, they present valuable information, some of which has never before been published in book form. Such topics include hygrothermal buckling, viscoelastic and plastic buckling, and buckling of various thickness plates. With this important collection, the Handbook of Thin Plate Buckling and Post Buckling provides you with a one-stop source of current research findings.

For a structure as large and as complex as a ship there are three levels of structural design, the second and most central of which is the subject of this book. Rationally-based design is design from first principles using the tools of modern engineering science: computer and the methods of structural analysis and optimization which computers have made possible. Thus, the rationally-based approach is ideally suited for preliminary structural design, and it is this approach and this level of design that is the subject of this book.

This volume contains the written texts of the papers presented at a Symposium on Buckling of Structures held at Harvard University in June 1974. This symposium, one of several on various topics sponsored annually by the International Union of Theoretical and Applied Mechanics (IUTAM), was organized by a Scientific Committee consisting of B. Budiansky (Chairman), A. H. Chilver, W. T. Koiter, and A. S. Vol'mir. Participation was by invitation of the Scientific Committee, and specific lecturers were invited to speak in the areas of experimental research, buckling and post-buckling calculations, post-buckling mode interaction, plasticity and creep effects, dynamic buckling, stochastic problems, and design. A total of 29 lectures were delivered, including a general opening lecture by Professor Koiter, and there were 93 registered participants from 16 different countries.

Financial support for the symposium was provided by IUTAM, in the form of partial travel support for a number of participants, and also by the National Science Foundation, the National Aeronautics and Space Administration, and the Air Force Office of Scientific Research, for additional travel support and administrative expenses. Meeting facilities and services were efficiently provided by the Science Center of Harvard University, and administrative support was generously provided by the Division of Engineering and Applied Physics of Harvard University. The scientific chairman enjoyed the invaluable assistance of his colleagues Professors J. W. Hutchinson and J. L.

This three-volume work presents the proceedings from the 19th International Ship and Offshore Structures Congress held in Cascais, Portugal on 7th to 10th September 2015. The International Ship and Offshore Structures Congress (ISSC) is a forum for the exchange of information by experts undertaking and applying marine structural research. The aim of

In recent years significant advances have been made in the development of methods and modeling procedures for structural assessment of marine structures. Various assessment methods are incorporated in the methods used to analyze and design efficient ship structures, as well as in the methods of structural reliability to be used to ensure the safety

In the last few decades, much research work was conducted to improve ship structure analysis and design. Most of the efforts were directed to improve the strength of hull girder and to use the method of finite element analysis more efficiently and effectively. Because of the high degree of complexity of ship structures the interaction between hull girder strength and local strength require special attention. The complex system of stresses could produce unacceptable deformations and high values of equivalent stresses. This book covers an area of ship structure analysis and design that has not been exhaustively covered by other books on ship structures in a simple form. It presents the basic concepts of the methods and procedures required to calculate torsion and shear stresses in ship structures. Moreover, it is enhanced with a set of some solved and unsolved problems, very useful for students of naval and marine engineering.

This publication presents the methods for the design of ships' structures. These methods are applicable to any medium or large vessel designed by direct calculation, as well as to the warship hulls on which the book was originally based, as these are invariably designed without recourse to classification society rules. Taking as its starting point an assumed functional specification, it shows how a structure can be created to meet this requirement.

Progress in the Analysis and Design of Marine Structures collects the contributions presented at MARSTRUCT 2017, the 6th International Conference on Marine Structures (Lisbon, Portugal, 8-10 May 2017). The MARSTRUCT series of Conferences started in Glasgow, UK in 2007, the second event of the series having taken place in Lisbon, Portugal in March 2009, the third in Hamburg, Germany in March 2011, the fourth in Espoo, Finland in March 2013, and the fifth in Southampton, UK in March 2015. This Conference series deals with Ship and Offshore Structures, addressing topics in the areas of: - Methods and Tools for Loads and Load Effects - Methods and Tools for Strength Assessment - Experimental Analysis of Structures - Materials and Fabrication of Structures - Methods and Tools for Structural Design and Optimisation, and - Structural Reliability, Safety and Environmental Protection Progress in the Analysis and Design of Marine Structures is essential reading for academics, engineers and all professionals involved in the design of marine and offshore structures.

The Definitive Reference for Designers and Design Students A solid grasp of the fundamentals of materials, along with a thorough understanding of load and design techniques, provides the components needed to complete a marine platform design. Design Principles of Ships and Marine Structures details every facet of ship design and design integration, and highlights the design aspects that must be put together to create an integrated whole product. This book discusses naval architecture and marine engineering applications and principles relevant to the design of various systems, examines advanced numerical techniques that can be applied to maritime design procedure at the concept design stage, and offers a comprehensive approach to the subject of ship design. Covers the Entire Sphere of Marine Design The book begins with an introduction to marine design and the marine environment, describing many of the marine products that are used for transportation, defense and the exploitation of marine resources. It also discusses stability issues relevant to ship design, as well as hydrodynamic aspects of resistance, propulsion, sea keeping and maneuvering, and their effects on design. In addition to covering the various systems and sub-systems that go into making a complex product to be used in maritime environment, the author explains engineering economics and its application in ship design, and provides examples wherever necessary. Written by an author with more than 35 years of teaching experience, this book: Describes various design methodologies such as sequential design process with the application of concurrent engineering and set based design factors in the use of computer-aided design techniques Highlights the shape design methodology of ship forms and layout design principles Considers design aspects relative to safety and risk assessment Introduces the design for production aspects in marine product development Discusses design principles for sustainability Explains the principles of numerical optimization for decision-making Design Principles of Ships and Marine Structures focuses on ship design efficiency, safety, sustainability, production, and management, and appeals to students and design professionals in the field of shipping, shipbuilding and offshore engineering.

**KEY FEATURES:** Provides researchers in Ocean engineering with a thorough review of the latest research in the field Lengthy reports by leading experts A valuable resource for all interested in ocean engineering **DESCRIPTION:** The International Ship and Offshore Congress (ISSC) is a forum for the exchange of information by experts undertaking and applying marine structural research. These three volumes contain the eight technical committee reports, six Specialist Committee and 2 Special Task Committee reports which were presented for the 15th International Ship and Offshore Structures Congress (ISSC 2004) in San Diego USA, between 11th and 15th August 2003. Volume III will be published in 2004 and is to contain the discussion of the reports, the chairmen's reply, the text of the invited Lecture and the congress report of ISSC 2003.

Marine Structural Design, Second Edition, is a wide-ranging, practical guide to marine structural analysis and design, describing in detail the application of modern structural engineering principles to marine and offshore structures. Organized in five parts, the book covers basic structural design principles, strength, fatigue and fracture, and reliability and risk assessment, providing all the knowledge needed for limit-state design and re-assessment of existing structures. Updates to this edition include new chapters on structural health monitoring and risk-based decision-making, arctic marine structural development, and the addition of new LNG ship topics, including composite materials and structures, uncertainty analysis, and green ship concepts. Provides the structural design principles, background theory, and know-how needed for marine and offshore structural design by analysis Covers strength, fatigue and fracture, reliability, and risk assessment together in one resource, emphasizing practical considerations and applications Updates to this edition include new chapters on structural health monitoring and risk-based decision making, and new content on arctic marine structural design

'Analysis and Design of Marine Structures' explores recent developments in methods and modelling procedures for structural assessment of marine structures: - Methods and tools for establishing loads and load effects; - Methods and tools for strength assessment; - Materials and fabrication of structures; - Methods and tools for structural design and optimisation; - Structural reliability, safety and environment protection. The book is a valuable reference source for academics, engineers and professionals involved in marine structures and design of ship and offshore structures.

In this book, the four authors show us the condensed experience how to design ship hull structures from a practical viewpoint. In three parts, the book presents the fundamentals, the theory and the

application of structural design of hulls. The topics are treated comprehensively with an emphasis on how to achieve reliable and efficient ship structures. The authors have in particular introduced their experiences with the rapid increase of ship sizes as well as the introduction of ship types with a high degree of specialization. The associated early failures of these "new" structures have been analyzed to provide the readers with illustrations why structural design needs to be carried out on several levels in order to ensure that correct loading is applied and that local structural behaviour is properly understood.

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