

# Dynamic Analysis And Design Of Offshore Structures Ocean Engineering Oceanography

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## **Sea Loads on Ships and Offshore Structures** - O. Faltinsen 1993-09-23

After introducing the theory of the structural loading on ships and offshore structures based on the motions of wind, waves and currents, this text demonstrates its applications to conventional and non-conventional sea vessels, including extensive exercises and examples.

## **Engineering Dynamics and Vibrations** - Junbo Jia 2018-12-12

Engineering dynamics and vibrations has become an essential topic for ensuring structural integrity and operational functionality in different engineering areas. However, practical problems regarding dynamics and vibrations are in many cases handled without success despite large expenditures. This book covers a wide range of topics from the basics to advances in dynamics and vibrations; from relevant engineering challenges to the solutions; from engineering failures due to inappropriate accounting of dynamics to mitigation measures and utilization of dynamics. It lays emphasis on engineering applications utilizing state-of-the-art information.

## **Offshore Structure Modeling** - Subrata Kumar Chakrabarti 1994-02-21

While the existing literature on offshore structures touch on model testing, a comprehensive text discussing the design, construction, instrumentation, testing and analysis of the physical model is lacking. This book fills that vacuum and provides, through its survey of the theoretical and practical aspects of physical modeling, an in-depth coverage of the technology of model testing. Its usefulness runs through the entire field of engineering, reaching far beyond its focus on offshore construction; and its breadth of scope should appeal not only to engineers and naval architects but to scientists interested in structural or hydraulic testing as well. Contents: Introduction Modeling Laws Model Construction Techniques Model Testing Facility Modeling of Environment Instrumentation and Signal Control Modeling of Fixed Offshore Structures Modeling of Offshore Operations Seakeeping Tests Data Analysis Techniques Readership: Undergraduates and engineers in coastal engineering, naval architects, scientists interested in structural or hydraulic testing. keywords: Physical Modeling; Scaling Laws; Hydrodynamics; Testing Facilities: Instruments; Offshore Structures; Wave Generation; Seakeeping "... a thorough and well-written book ... could only have been written by someone with a wealth of personal experience. The breadth of material in each chapter is truly impressive and valuable; and the abundance of relevant references ... adds considerably to the value of the book. These references will be especially beneficial to those wishing to pursue the individual topics in more detail ... it will serve as a valuable reference to anyone working in this field. It is an important contribution to the field of offshore modelling." Coastal Engineering

## **Dynamics of Fixed Marine Structures** - N. D. P. Barltrop 2013-10-22

Dynamics of Fixed Marine Structures, Third Edition proves guidance on the dynamic design of fixed structures subject to wave and current action. The text is an update of the "UR8" design guide "Dynamics of Marine Structures" with discussion of foundations, wind turbulence, offshore installations, earthquakes, and strength and fatigue. The book employs analytical methods of static and dynamic structural analysis techniques, particularly the statistical and spectral methods when applied to loading and in the calculating dynamic responses. The statistical methods are explained when used to wave, wind, and earthquake calculations, together with the problems encountered in actual applications. Of importance to fixed offshore platforms are the soil properties and foundation covering soil behavior, site investigation, testing, seabed stability, gravity structures, and the use of single piles. Methods of forecasting, measuring,

and modeling of waves and currents are also presented in offshore structure construction. Basic hydrodynamics is explained in understanding wave theory, and some description is given to forecasting of environmental conditions that will affect the structures. The effects of vortex-induced vibrations on the structure are explained, and the three methods that can prevent vortex-induced oscillations are given. Wind turbulence or wind loads are analyzed against short natural period or long natural periods of structures. The transportation of offshore platforms, installation, and pile driving, including examples of the applications found in the book, are given as well. The guide is helpful for offshore engineers, designers of inshore jetties, clients needing design and analysis work, specialists related to offshore structural engineering, and students in offshore engineering.

## **Dynamics of Offshore Structures** - James F. Wilson 2003-01-03

Unique, cutting-edge material on structural dynamics and natural forces for offshore structures Using the latest advances in theory and practice, Dynamics of Offshore Structures, Second Edition is extensively revised to cover all aspects of the physical forces, structural modeling, and mathematical methods necessary to effectively analyze the dynamic behavior of offshore structures. Both closed-form solutions and the Mathematica(r) software package are used in many of the up-to-date example problems to compute the deterministic and stochastic structural responses for such offshore structures as buoys; moored ships; and fixed-bottom, cable-stayed, and gravity-type platforms. Throughout the book, consideration is given to the many assumptions involved in formulating a structural model and to the natural forces encountered in the offshore environment. These analyses focus on plane motions of elastic structures with linear and nonlinear restraints, as well as motions induced by the forces of currents, winds, earthquakes, and waves, including the latest theories and information on wave mechanics. Topics addressed include multidegree of freedom linear structures, continuous system analysis (including the motion of cables and pipelines), submerged pile design, structural modal damping, fluid-structure-soil interactions, and single degree of freedom structural models that, together with plane wave loading theories, lead to deterministic or time history predictions of structural responses. These analyses are extended to statistical descriptions of both wave loading and structural motion. Dynamics of Offshore Structures, Second Edition is a valuable text for students in civil and mechanical engineering programs and an indispensable resource for structural, geotechnical, and construction engineers working with offshore projects.

## **Ocean Structures** - Srinivasan Chandrasekaran 2017-01-06

This book addresses the concepts of material selection and analysis, choice of structural form, construction methods, environmental loads, health monitoring, non-destructive testing, and repair methodologies and rehabilitation of ocean structures. It examines various types of ocean and offshore structures, including drilling platforms, processing platforms and vessels, towers, sea walls and surge barriers, and more. It also explores the use of MEMS in offshore structures, with regard to military and oil exploration applications. Full-color figures as well as numerous solved problems and examples are included to help readers understand the applied concepts.

## **Structural Analysis Fundamentals** - Ramez Gayed 2021-09-15

Structural Analysis Fundamentals presents fundamental procedures of structural analysis, necessary for teaching undergraduate and graduate courses and structural design practice. It applies linear analysis of structures of all types, including beams, plane and space trusses, plane and space frames, plane and

eccentric grids, plates and shells, and assemblage of finite-elements. It also treats plastic and time-dependent responses of structures to static loading, as well as dynamic analysis of structures and their response to earthquakes. Geometric nonlinearity in analysis of cable nets and membranes are examined. This is an ideal text for basic and advanced material for use in undergraduate and higher courses. A companion set of computer programs assist in a thorough understanding and application of analysis procedures. The authors provide a special program for each structural system or each procedure. Unlike commercial software, the user can apply any program of the set without a manual or training period. Students, lecturers and engineers internationally employ the procedures presented in in this text and its companion website. Ramez B. Gayed is a Civil Engineering Consultant and Adjunct Professor at the University of Calgary. He is expert on analysis and design of concrete and steel structures. Amin Ghali is Emeritus Professor at the University of Calgary. He is consultant on major international structures. He is inventor of several reinforcing systems for concrete. He has authored over 300 papers and eight patents. His books include Concrete Structures (2012), Circular Storage Tanks and Silos (CRC Press, 2014), and Structural Analysis (CRC Press, 2017).

**Mooring System Engineering for Offshore Structures** - Kai-Tung Ma 2019-06-04

The mooring system is a vital component of various floating facilities in the oil, gas, and renewables industries. However, there is a lack of comprehensive technical books dedicated to the subject. Mooring System Engineering for Offshore Structures is the first book delivering in-depth knowledge on all aspects of mooring systems, from design and analysis to installation, operation, maintenance and integrity management. The book gives beginners a solid look at the fundamentals involved during mooring designs with coverage on current standards and codes, mooring analysis and theories behind the analysis techniques. Advanced engineers can stay up-to-date through operation, integrity management, and practical examples provided. This book is recommended for students majoring in naval architecture, marine or ocean engineering, and allied disciplines in civil or mechanical engineering. Engineers and researchers in the offshore industry will benefit from the knowledge presented to understand the various types of mooring systems, their design, analysis, and operations. Understand the various types of mooring systems and the theories behind mooring analysis Gain practical experience and lessons learned from worldwide case studies Combine engineering fundamentals with practical applications to solve today's offshore challenges

**Essentials of Offshore Structures** - D.V. Reddy 2013-06-24

Essentials of Offshore Structures: Framed and Gravity Platforms examines the engineering ideas and offshore drilling platforms for exploration and production. This book offers a clear and acceptable demonstration of both the theory and application of the relevant procedures of structural, fluid, and geotechnical mechanics to offshore structures. It makes available a multitude of "solved problems" and "sample problems to solve" which give readers a strong understanding of the analysis and design of steel-framed and base-supported concrete gravity offshore structures. The book highlights sensible engineering applications for offshore structural design, research, and development; it can also be useful to those working in the design industry. The user will have a detailed overview of the various structures used in the offshore environment and the preliminary costing factors that will influence their choice for the site. Analytical principles emphasized in the book will help the user to clearly comprehend the various issues that need to be taken into account in the analysis and design of an offshore structure, using the API code. The book includes extensive worked-out problems and sample problems for use by the students and instructors, with a Solution Manual. The seabed pile/gravity foundation analyses and design are clearly outlined with their embedment characteristics and problems worked out. A global description of environmental forces has been given that includes those due to wave, wind, current, tides, earthquakes, ice floe/sheet action, and limit ice-load on Arctic structures. The book outlines the various factors that influence the material choice for offshore structures including fatigue and corrosion of the platforms in the ocean environment. Separate chapters detail the factors that influence the pile embedment and concrete gravity foundation characteristics, material choice including fatigue and corrosion, estimation of ocean environmental forces that will be exerted on the offshore structures, and the analysis fundamentals that the reader needs to possess. The last two chapters give detailed insights into the analysis and design of framed

and concrete gravity platform offshore structures using API code procedures. Overall, this book is a comprehensive presentation of the analysis and design of steel and concrete offshore structures. *Dynamic Analysis and Design of Offshore Structures* - Srinivasan Chandrasekaran 2017-10-12 This book introduces readers to various types of offshore platform geometries. It addresses the various environmental loads encountered by these structures, and provides detailed descriptions of the fundamentals of structural dynamics in a classroom style, helping readers estimate damping in offshore structures and grasp these aspects' applications in preliminary analysis and design. Basic concepts of structural dynamics are emphasized through simple illustrative examples and exercises. Design methodologies and guidelines, which are FORM based concepts, are explained through a selection of applied sample structures. Each chapter also features tutorials and exercises for self-learning. A dedicated chapter on stochastic dynamics helps students to extend the basic concepts of structural dynamics to this advanced domain of research. Hydrodynamic response of offshore structures with perforated members is one of the most recent research applications, and has proven to be one of the most effective means of retrofitting offshore structures. In addition, the book integrates the concepts of structural dynamics with the FORM-evolved design of offshore structures, offering a unique approach. This new edition is divided into seven chapters, each of which has been updated. Each chapter also includes a section on frequently asked Questions and Answers (Q&A), which enhances understanding of this complex subject through easy and self-explanatory text. Furthermore, the book presents valuable content with respect to new and recent research carried out by the author in structural dynamics. All numeric examples have been re-checked with more additional explanations. New exercises have been added to improve understanding of the subject matter. Computer coding is also included (wherever possible) to aid computer-based learning of the contents of the book. The book can serve as a textbook for senior undergraduate and graduate courses in civil, structural, applied mechanics, mechanical, aerospace, naval architecture and ocean engineering programs. The book can also serve as a text for professional learning and development programs or as a guide for practicing and consulting offshore structural engineers. The contents of this book will be useful to graduate students, researchers, and professionals alike.

*Offshore Semi-Submersible Platform Engineering* - Srinivasan Chandrasekaran 2020-12-23

Offshore Semi-Submersible Platform Engineering presents a primer on the analysis and design of semi-submersible platforms, in particular, while also covering general analysis and design guidelines of offshore compliant platforms. It introduces general structural designs and also examines the details of the various environmental impacts that act upon them, such as fatigue, fire, collisions, and water waves. Features Provides thorough coverage of the dynamic analysis and design of semi-submersible platforms Assists readers through detailed analysis methods using MATLAB® as well as other computer programs used to carry out structural analysis Explains impact loading and dynamic response through numerical analysis and examines the various factors that affect semi-submersibles Presented in a coursework teaching style, the content is explained in a step-by-step manner using color figures, photos, screen shots, and illustrations, thereby enabling students, researchers, and practicing engineers to carry out analysis with ease Offshore Semi-Submersible Platform Engineering serves as a practical guide for upper-level students and graduates of various engineering disciplines, for example, naval architecture, and structural, mechanical, pipeline, and offshore engineering. Further, it can also be used as a reference for practicing professionals, as the book covers a broad range of scholarships and applications.

Handbook of Offshore Engineering (2-volume Set) - Subrata Chakrabarti 2005-08-19

\* Each chapter is written by one or more invited world-renowned experts \* Information provided in handy reference tables and design charts \* Numerous examples demonstrate how the theory outlined in the book is applied in the design of structures Tremendous strides have been made in the last decades in the advancement of offshore exploration and production of minerals. This book fills the need for a practical reference work for the state-of-the-art in offshore engineering. All the basic background material and its application in offshore engineering is covered. Particular emphasis is placed in the application of the theory to practical problems. It includes the practical aspects of the offshore structures with handy design guides, simple description of the various components of the offshore engineering and their functions. The primary purpose of the book is to provide the important practical aspects of offshore engineering without going into

the nitty-gritty of the actual detailed design. · Provides all the important practical aspects of ocean engineering without going into the 'nitty-gritty' of actual design details · Simple to use - with handy design guides, references tables and charts · Numerous examples demonstrate how theory is applied in the design of structures

**Essentials of Offshore Structures** - D.V. Reddy 2016-04-19

Essentials of Offshore Structures: Framed and Gravity Platforms examines the engineering ideas and offshore drilling platforms for exploration and production. This book offers a clear and acceptable demonstration of both the theory and application of the relevant procedures of structural, fluid, and geotechnical mechanics to offshore structures. It

Design of Marine and Offshore Structures - T. K. S. Murthy 1992

**Dynamic Analysis of Offshore Structures** - C.A. Brebbia 2013-10-22

Dynamic Analysis of Offshore Structures appraises offshore structures, particularly the major sources of uncertainty in the design process. The book explains the fundamentals of probabilistic processes, the theory or analysis of sea states, and the random-vibration approach to structural response. The text describes the hydrodynamics of water waves, wave forecasting, and the statistical parameters associated with sea-states. The investigator can use Morison's equation to calculate the impact of wave forces acting on slender members such as on lattice-type structures. Or he can employ the diffraction theory to calculate wave forces acting on large-diameter bodies such as concrete gravity-type structures. Other environmental forces he should be concerned with are the effects of currents and winds. The book examines the theory of vibration (including the spectral approach), the theory of vibration on multi-degree-of-freedom structures, matrix analysis of structural response, problems of fatigue, and soil-structure interaction. The book notes the importance of the method of analysis used, with emphasis on the following: dynamic analysis, frequency domain, and linearization of drag. Two types of analysis follow linearization of drag: deterministic analysis (applied in a series of design waves which uses the long-term exceedance diagram for fatigue); or probabilistic analysis (used to study the behavior of the structure during the extreme design storm and its long term behavior for a range of sea states). The book can prove useful for structural, civil, or maritime engineers, as well as for students in one-year courses in offshore structure analysis at the postgraduate or final-year undergraduate level.

**Design Aids of Offshore Structures Under Special Environmental Loads including Fire Resistance**

- Srinivasan Chandrasekaran 2018-01-12

This book provides detailed analysis methods and design guidelines for fire resistance, a vital consideration for offshore processing and production platforms. Recent advancements in the selection of various geometric structural forms for deep-water oil exploration and production require a detailed understanding of the design of offshore structures under special loads. Focusing on a relatively new aspect of offshore engineering, the book offers essential teaching material, illustrating and explaining the concepts discussed through many tutorials. It creates a basis for designing new courses for students of ocean engineering and naval architecture, civil engineering, and applied mechanics at both undergraduate and graduate levels. As such, its content can be used for self-study or as a text in structured courses and professional development programs.

**Offshore Compliant Platforms** - Srinivasan Chandrasekaran 2020-01-28

A guide to the analysis and design of compliant offshore structures that highlights a new generation of platforms Offshore Compliant Platforms provides an authoritative guide to the analysis and design of compliant offshore structures and puts the focus on a new generation of platforms such as: triceratops, Buoyant Leg Storage and Regasification platforms. Whilst the authors - noted experts on the topic - include basic information on the conceptual development of conventional platforms, the book presents detailed descriptions of the design and development of new deep-water platforms. The book describes the preliminary design of triceratops in ultra-deep waters and presents a detailed analysis of environmental loads that are inherent in offshore locations such as wave, wind and current. The new methodology for the dynamic analysis of triceratops under ice loads, predominantly in ice-covered regions, is also examined with detailed parametric studies. In addition, the book covers the structural geometry and the various methods

of analysis for assessing the performance of any other similar offshore platform under the special loads. A discussion of the fatigue analysis and service life prediction is also included. This important book: • Includes the analysis and design of compliant offshore structures with a focus on a new generation of platforms • Examines the preliminary design of triceratops in ultra-deep waters • Covers an analysis of environmental loads that are inherent in offshore locations such as wave, wind and current • Reviews the structural geometry and various methods of analysis for assessing the performance of any other similar offshore platform under special loads • Discusses fatigue analysis and service life prediction Written for engineers and researchers across engineering including civil, mechanical, structural, offshore, ocean and naval architecture, Offshore Compliant Platforms fills the need for a guide to new offshore platforms that provides an understanding of the behaviour of these structures under different loading conditions.

*Dynamics of Offshore Structures* - Minoo H Patel 2013-10-22

Dynamics of Offshore Structures provides an integrated treatment of the main subject areas that contribute to the design, construction, installation, and operation of fixed and floating offshore structures. The book begins with an overview of offshore oil and gas development and offshore structures. Separate chapters follow on the ocean environment; basic fluid mechanics; gravity wave theories; fluid loading on offshore structures; hydrostatics and dynamic response of floating bodies; and model testing of offshore structures. This book is prepared with particular emphasis on the fundamentals of oceanography, basic fluid mechanics, wave theory, hydrodynamics, naval architecture, and structural analysis to meet the needs of students reading ocean engineering or naval architecture, at both undergraduate and postgraduate levels. Basic equations and theoretical results are derived in a rigorous manner but sections on model testing, full-scale measurements, design, and certification are also included to ensure that the book is of value to professional engineers seeking a balanced treatment of fundamental and practical issues.

*Marine Structural Design* - Yong Bai 2015-09-18

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

**Applied Mechanics Reviews** - 1978

*Stochastic Dynamics of Marine Structures* - Arvid Naess 2013

For students and professionals, this covers theory and methods for stochastic modelling and analysis of marine structures under environmental loads.

Offshore Structures - Mohamed A. El-Reedy 2012-08-21

With most of the easy gas and oil reserves discovered and prices rebounding, companies are now drilling far offshore in extreme weather condition environments. As deepwater wells are drilled to greater depths, engineers and designers are confronted with new problems such as water depth, weather conditions, ocean currents, equipment reliability, and well accessibility. Offshore Structure Design, Construction and Maintenance covers all types of offshore structures and platforms employed worldwide. The ultimate reference for selecting, operating and maintaining offshore structures, this book provides a road map for designing structures which will stand up even in the harshest environments. The selection of the proper type of offshore structure is discussed from a technical and economic point of view. The design procedure for the fixed offshore structure will be presented and how to review the design to reach the optimum solution. Nonlinear analysis (Push over) analysis will be presented as a new technique to design and assess

the existing structure. Pile design and tubular joint with the effect of fatigue loading will be presented also from a theoretical and a practical point of view. With this book in hand, engineers receive the most up-to-date methods for performing a structural life cycle analysis; implement maintenance plans for topsides and jackets, using non destructive testing. Under water inspection is discussed for hundreds of platforms in detail. Advanced repair methodology for scour, marine growth and damaged or deteriorating members are discussed. Risk based under water inspection techniques are covered from a practical point of view. In addition, the book will be supported by an online modeling and simulation program which will allow designers to save time and money by verifying assumptions online. One stop guide to offshore structure design and analysis Easy to understand methods for structural life cycle analysis Expert advice for designing offshore platforms for all types of environments Save time and money by verifying designs online  
**Energy Research Abstracts** - 1978

**Engineering Challenges for Sustainable Future** - Noor Amila Wan Abdullah Zawawi 2016-12-01  
Engineering Challenges for Sustainable Future contains the papers presented at the 3rd International Conference on Civil, Offshore & Environmental Engineering (ICCOEE2016, Kuala Lumpur, Malaysia, 15-17 August 2016), under the banner of World Engineering, Science & Technology Congress (ESTCON2016). The ICCOEE series of conferences started in Kuala Lumpur, Malaysia 2012, and the second event of the series took place in Kuala Lumpur, Malaysia 2014. This conference series deals with the civil, offshore & environmental engineering field, addressing the following topics: • Environmental and Water Resources Engineering • Coastal and Offshore Engineering • Structures and Materials • Construction and Project Management • Highway, Geotechnical and Transportation Engineering and Geo-informatics This book is an essential reading for academic, engineers and all professionals involved in the area of civil, offshore and environmental engineering.

**Advanced Structural Analysis with MATLAB®** - Srinivasan Chandrasekaran 2018-12-07  
Building structures are unique in the field of engineering, as they pose challenges in the development and conceptualization of their design. As more innovative structural forms are envisioned, detailed analyses using computer tools are inevitable. This book enables readers to gain an overall understanding of computer-aided analysis of various types of structural forms using advanced tools such as MATLAB®. Detailed descriptions of the fundamentals are explained in a "classroom" style, which will make the content more user-friendly and easier to understand. Basic concepts are emphasized through simple illustrative examples and exercises, and analysis methodologies and guidelines are explained through numerous example problems.  
Energy Research Abstracts - 1986

**Advanced Steel Design of Structures** - Srinivasan Chandrasekaran 2019-11-01  
Advanced Steel Design of Structures examines the design principles of steel members under special loads and covers special geometric forms and conditions not typically presented in standard design books. It explains advanced concepts in a simple manner using numerous illustrative examples and MATLAB® codes. Features: Provides analysis of members under unsymmetrical bending Includes coverage of structures with special geometry and their use in offshore applications for ultra-deep water oil and gas exploration Presents numerical modeling and analysis of steel members under fire conditions, impact, and blast loads Includes MATLAB® examples that will aid in the capacity building of civil engineering students approaching this complex subject Written for a broad audience, the presentation of design concepts of steel members will be suitable for upper-level undergraduate students. The advanced design theories for offshore structures under special loads will be an attractive feature for post-graduate students and researchers. Practicing engineers will also find the book useful, as it includes numerous solved examples and practical tutorials.

*Dynamics of Offshore Structures* - Minoo H. Patel 1989

A textbook for upper division or graduate students of ocean or naval engineering presenting the main subject areas that contribute to the design, construction, installation and operation of fixed and floating offshore structures, with emphasis on the fundamentals of oceanography, basic fluid mechanics, wave

theory, hydrodynamics, naval architecture and structural analysis. Annotation copyrighted by Book News, Inc., Portland, OR

**Wave Energy Devices** - Srinivasan Chandrasekaran 2022

"Designing offshore wave energy converters (WEC) devices requires a thorough understanding of many aspects of science and engineering, namely wave hydrodynamics, wave-WEC interactions, mechanical design aspects, analysis tools, and good experience in conducting experiments. This book provides the tools for understanding these complex systems and addresses the basic concepts of WECs through to detailed analysis and design. A few devices developed and experimentally investigated are discussed in detail, some of which are considered highly novel and still in the preliminary stages of study in the existing literature. Features: Offers numerous detailed design methods and practical model studies Presents analysis of the dynamic response behavior of WECs, based upon experimental studies on scale models Covers the most recent and novel innovations in the field Includes discussion of offshore wind farms as another green energy alternative, and examines their conceptual development and design This book serves as a useful guide for both academicians and offshore practicing professionals in naval architecture and offshore engineering, as well as civil and structural engineering. In addition, it also helps in understanding structural behavior in terms of its risk criteria, efficiency, service life, and reliability. Readers will gain comprehensive knowledge about the design and development of offshore wave energy devices and the preliminary design of offshore wind turbines, which are currently largely absent in the scientific literature"-

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*Design of Marine Risers with Functionally Graded Materials* - Srinivasan Chandrasekaran 2020-11-09  
Design of Marine Risers with Functionally Graded Materials focuses on the application and use of marine risers fabricated with functionally graded materials (FGM) in ocean environments. Chapters cover the various types of marine risers available, common problems (corrosion), their fabrication and manufacturing, and their application and use in marine risers. A functionally graded materials mould is then subsequently investigated by various structural and metallurgical examinations to assess its suitability as an alternate material in the marine environment. Several characteristics of the newly developed FGM are compared with other conventional materials to explicitly highlight the superiority of the newly developed FGM. Further chapters focus on novel design methods, such as VIV suppression systems for risers with detailed experimental investigations carried out on cylinders and a chapter on advanced materials, including titanium and composites and their application and use in the marine environment. Covers all types of marine risers, materials, properties and behavior Features advances in design for functionally graded materials in marine risers and offshore structures Includes new additive manufacturing techniques and the design of vortex induced vibrations in marine risers

Offshore Mechanics - Madjid Karimirad 2018-05-07

Covers theoretical concepts in offshore mechanics with consideration to new applications, including offshore wind farms, ocean energy devices, aquaculture, floating bridges, and submerged tunnels This comprehensive book covers important aspects of the required analysis and design of offshore structures and systems and the fundamental background material for offshore engineering. Whereas most of the books currently available in the field use traditional oil, gas, and ship industry examples in order to explain the fundamentals in offshore mechanics, this book uses more recent applications, including recent fixed-bottom and floating offshore platforms, ocean energy structures and systems such as wind turbines, wave energy converters, tidal turbines and hybrid marine platforms. Offshore Mechanics covers traditional and more recent methodologies used in offshore structure modelling (including SPH and hydroelasticity models). It also examines numerical techniques, including computational fluid dynamics and finite element method. Additionally, the book features easy-to-understand exercises and examples. Provides a comprehensive treatment for the case of recent applications in offshore mechanics for researchers and engineers Presents the subject of computational fluid dynamics (CFD) and finite element methods (FEM) along with the high fidelity numerical analysis of recent applications in offshore mechanics Offers insight into the philosophy and power of numerical simulations and an understanding of the mathematical nature of the fluid and structural dynamics with focus on offshore mechanic applications Offshore Mechanics: Structural and Fluid Dynamics for Recent Applications is an important book for graduate and senior undergraduate students in

offshore engineering and for offshore engineers and researchers in the offshore industry.

*Dynamic Analysis and Design of Offshore Structures* - Srinivasan Chandrasekaran 2019-02-11

This book introduces readers to various types of offshore platform geometries. It addresses the various environmental loads encountered by these structures, and provides detailed descriptions of the fundamentals of structural dynamics in a classroom style, helping readers estimate damping in offshore structures and grasp these aspects' applications in preliminary analysis and design. Basic concepts of structural dynamics are emphasized through simple illustrative examples and exercises. Design methodologies and guidelines, which are FORM based concepts, are explained through a selection of applied sample structures. Each chapter also features tutorials and exercises for self-learning. A dedicated chapter on stochastic dynamics helps students to extend the basic concepts of structural dynamics to this advanced domain of research. Hydrodynamic response of offshore structures with perforated members is one of the most recent research applications, and has proven to be one of the most effective means of retrofitting offshore structures. In addition, the book integrates the concepts of structural dynamics with the FORM-evolved design of offshore structures, offering a unique approach. This new edition is divided into seven chapters, each of which has been updated. Each chapter also includes a section on frequently asked Questions and Answers (Q&A), which enhances understanding of this complex subject through easy and self-explanatory text. Furthermore, the book presents valuable content with respect to new and recent research carried out by the author in structural dynamics. All numeric examples have been re-checked with more additional explanations. New exercises have been added to improve understanding of the subject matter. Computer coding is also included (wherever possible) to aid computer-based learning of the contents of the book. The book can serve as a textbook for senior undergraduate and graduate courses in civil, structural, applied mechanics, mechanical, aerospace, naval architecture and ocean engineering programs. The book can also serve as a text for professional learning and development programs or as a guide for practicing and consulting offshore structural engineers. The contents of this book will be useful to graduate students, researchers, and professionals alike.

**Analysis and Design of Steel and Composite Structures** - Qing Quan Liang 2018-10-08

Steel and composite steel-concrete structures are widely used in modern bridges, buildings, sport stadia, towers, and offshore structures. Analysis and Design of Steel and Composite Structures offers a comprehensive introduction to the analysis and design of both steel and composite structures. It describes the fundamental behavior of steel and composite members and structures, as well as the current design criteria and procedures given in Australian standards AS/NZS 1170, AS 4100, AS 2327.1, Eurocode 4, and AISC-LRFD specifications. Featuring numerous step-by-step examples that clearly illustrate the detailed analysis and design of steel and composite members and connections, this practical and easy-to-understand text: Covers plates, members, connections, beams, frames, slabs, columns, and beam-columns Considers bending, axial load, compression, tension, and design for strength and serviceability Incorporates the author's latest research on composite members Analysis and Design of Steel and Composite Structures is an essential course textbook on steel and composite structures for undergraduate and graduate students of structural and civil engineering, and an indispensable resource for practising structural and civil engineers and academic researchers. It provides a sound understanding of the behavior of structural members and systems.

*Health, Safety, and Environmental Management in Offshore and Petroleum Engineering* - Srinivasan Chandrasekaran 2016-02-29

This book shares the technical knowhow in the field of health, safety and environmental management, as applied to oil and gas industries and explains concepts through a simple and straightforward approach Provides an overview of health, safety and environmental (HSE) management as applied to offshore and petroleum engineering Covers the fundamentals of HSE and demonstrates its practical application Includes industry case studies and examples based on the author's experiences in both academia and oil and gas industries Presents recent research results Includes tutorials and exercises

*Analysis and Design of Marine Structures* - Carlos Guedes Soares 2009-03-06

'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.

*Advanced Marine Structures* - Srinivasan Chandrasekaran 2015-08-18

Due in part to a growing demand for offshore oil and gas exploration, the development of marine structures that initially started onshore is now moving into deeper offshore areas. Designers are discovering a need to revisit basic concepts as they anticipate the response behavior of marine structures to increased water depths. Providing a simplified approach to the subject, Advanced Marine Structures explains the fundamentals and advanced concepts of marine architecture introduces various types of offshore platforms, and outlines the different stages of marine structure analysis and design. Written from a structural engineering perspective, this book focuses on structures constructed for offshore oil and gas exploration, various environmental loads, ultimate load design, fluid-structure interaction, fatigue, and fracture. It also offers detailed descriptions of different types of structural forms, functions and limitations of offshore platforms and explains how different loads act on each. In addition, the text incorporates examples and application problems to illustrate the use of experimental, numerical, and analytical studies in the design and development of marine structures, and reviews relevant literature on wave interaction and porous cylinders. This book: Focuses on structural reliability Deliberates on fracture and fatigue and examines their application in marine structures Introduces ideas on the retrofit and renovation of marine structures Examines the strength analysis of offshore structures and structural members Advanced Marine Structures examines the design of offshore structures from a structural engineering perspective and explains the design methodologies and guidelines needed for the progressive conceptualization and design of advanced marine structures.

**Offshore Structures** - Mohamed A. El-Reedy 2019-11-06

Offshore Structures: Design, Construction and Maintenance, Second Edition covers all types of offshore structures and platforms employed worldwide. As the ultimate reference for selecting, operating and maintaining offshore structures, this book provides a roadmap for designing structures which will stand up even in the harshest environments. Subsea pipeline design and installation is also covered in this edition, as is the selection of the proper type of offshore structure, the design procedure for the fixed offshore structure, nonlinear analysis (Push over) as a new technique to design and assess the existing structure, and more. With this book in hand, engineers will have the most up-to-date methods for performing a structural lifecycle analysis, implementing maintenance plans for topsides and jackets and using non-destructive testing. Provides a one-stop guide to offshore structure design and analysis Presents easy-to-understand methods for structural lifecycle analysis Contains expert advice for designing offshore platforms for all types of environments

*Design and Analysis of Tall and Complex Structures* - Feng Fu 2018-02-01

The design of tall buildings and complex structures involves challenging activities, including: scheme design, modelling, structural analysis and detailed design. This book provides structural designers with a systematic approach to anticipate and solve issues for tall buildings and complex structures. This book begins with a clear and rigorous exposition of theories behind designing tall buildings. After this is an explanation of basic issues encountered in the design process. This is followed by chapters concerning the design and analysis of tall building with different lateral stability systems, such as MRF, shear wall, core, outrigger, bracing, tube system, diagrid system and mega frame. The final three chapters explain the design principles and analysis methods for complex and special structures. With this book, researchers and designers will find a valuable reference on topics such as tall building systems, structure with complex geometry, Tensegrity structures, membrane structures and offshore structures. Numerous worked-through examples of existing prestigious projects around the world (such as Jeddah Tower, Shanghai Tower, and Petronas Tower etc.) are provided to assist the reader's understanding of the topics. • Provides the latest modelling methods in design such as BIM and Parametric Modelling technique. • Detailed explanations of widely used programs in current design practice, such as SAP2000, ETABS, ANSYS, and Rhino. • Modelling case studies for all types of tall buildings and complex structures, such as: Buttressed Core system, diagrid

system, Tube system, Tensile structures and offshore structures etc.

**Progress in the Analysis and Design of Marine Structures** - Carlos Guedes Soares 2017-04-28

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.

*Compliant Offshore Structures* - Minoo H Patel 2013-10-22

Compliant Offshore Structures deals with some aspects of the mechanics of compliant offshore structures. Analysis methods for determining the hydrostatic and hydrodynamic behavior, at wave frequencies only, of conventional and novel compliant structure types are described. The contribution of hull configuration for tandem hull vessels and of pneumatic compliances for ship shape and semi-submersible vessels is also emphasized. Comprised of 11 chapters, this book begins with an overview of the various conventional and emerging methods of hydrostatic and hydrodynamic analysis that are available for characterizing compliant marine structures. The response of compliant structures to ocean waves is given emphasis, along with the hydrostatic stability of a compliant vessel. The discussion then turns to the use of analysis methods for a variety of conventional and novel compliant structures such as semi-submersibles, ship forms, tensioned buoyant platforms, crane vessels, and vertical marine risers. However, those compliant structures that are believed to have a future application or, alternatively, are useful in illustrating an interesting performance feature are also considered. Among such structures are those with articulated joints, pneumatic compliances, and tandem hull marine vehicles. This monograph is intended for practicing engineers as well as undergraduate and postgraduate students.