

Digital Sonar Design In Underwater Acoustics Principles And Applications Advanced Topics In Science And Technology In China

Underwater Acoustic System Analysis provides a comprehensive exploration of underwater acoustics, acoustic signal generation, and acoustic signal processing for the practicing systems analyst and systems engineer. This second edition, first published in 1991, contains all the valuable information in the earlier edition plus a detailed discussion of adaptive processing as applied to spatial filtering. Highlights of the book are: * Generation and propagation of compressional acoustic waves in the ocean * narrowband signatures of surface ships caused by cavitating propeller blades and diesel engine firing * Optimization of signal-to-noise ratio and spatial resolution in the presence of multiple acoustic signals * Ambient noise in the ocean, and * Examples of system performance analysis

Lists citations with abstracts for aerospace related reports obtained from world wide sources and announces documents that have recently been entered into the NASA Scientific and Technical Information Database.

Introduction to Adaptive Arrays serves as an introduction to the subject of adaptive sensor systems whose principle purpose is to enhance the detection and reception of

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certain desired signals. The field of array sensor systems is now a maturing technology. With applications of these systems growing more and more numerous, there is a wealth of widely scattered literature on various aspects of such systems. Unfortunately, few books attempt to provide an integrated treatment of the entire system that gives the reader the perspective to organize the available literature into easily understood parts. Intended for use both as a graduate level textbook and as a reference work for engineers, scientists, and systems analysts, this book provides such an integrated treatment by emphasizing the principles and techniques that are of fundamental importance in modern adaptive array systems.

The most comprehensive book on electroacoustic transducers and arrays for underwater sound Includes transducer modeling techniques and transducer designs that are currently in use Includes discussion and analysis of array interaction and nonlinear effects in transducers Contains extensive data in figures and tables needed in transducer and array design Written at a level that will be useful to students as well as to practicing engineers and scientists

A blend of introductory material and advanced signal processing and communication techniques, of critical importance to underwater system and network development This book, which is the first to describe the processing techniques central to underwater OFDM, is arranged into four distinct sections: First, it describes the characteristics of underwater acoustic channels, and stresses the difference from wireless radio

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channels. Then it goes over the basics of OFDM and channel coding. The second part starts with an overview of the OFDM receiver, and develops various modules for the receiver design in systems with single or multiple transmitters. This is the main body of the book. Extensive experimental data sets are used to verify the receiver performance. In the third part, the authors discuss applications of the OFDM receiver in i) deep water channels, which may contain very long separated multipath clusters, ii) interference-rich environments, where an unintentional interference such as Sonar will be present, and iii) a network with multiple users where both non-cooperative and cooperative underwater communications are developed. Lastly, it describes the development of a positioning system with OFDM waveforms, and the progress on the OFDM modem development. Closely related industries include the development and manufacturing of autonomous underwater vehicles (AUVs) and scientific sensory equipment. AUVs and sensors in the future could integrate modems, based on the OFDM technology described in this book. Contents includes: Underwater acoustic channel characteristics/OFDM basics/Peak-to-average-ratio control/Detection and Doppler estimation (Doppler scale and CFO)/Channel estimation and noise estimation/A block-by-block progressive receiver and performance results/Extensions to multi-input multi-output OFDM/Receiver designs for multiple users/Cooperative underwater OFDM (Physical layer network coding and dynamic coded cooperation)/Localization with OFDM waveforms/Modem developments A valuable resource for Graduate and

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postgraduate students on electrical engineering or physics courses; electrical engineers, underwater acousticians, communications engineers

Includes Citations and Patents abstracts sections.

This volume presents the Proceedings of the Sixth International Conference on Green and Human Information Technology (ICGHIT), held in Chiang Mai, Thailand, Jan 31-Feb 2, 2018. ICGHIT is the unique global conference for researchers, industry professionals, and academics interested in the latest development of green and human information technology. Its broad scope ranges from electronics to communications, computers, multimedia and signal processing, control and intelligent systems, IC and convergence technologies, which are related to green and human issues such as energy saving and human welfare. Specially in this volume, ICGHIT covers state-of-the-art technologies for the 4th industrial revolution, for example, cyber security, big data and cloud service, smart medical system, machine learning and its applications.

Underwater acoustic digital signal processing and communications is an area of applied research that has witnessed major advances over the past decade.

Rapid developments in this area were made possible by the use of powerful digital signal processors (DSPs) whose speed, computational power and portability allowed efficient implementation of complex signal processing

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algorithms and experimental demonstration of their performance in a variety of underwater environments. The early results served as a motivation for the development of new and improved signal processing methods for underwater applications, which today range from classical of autonomous underwater vehicles and sonar signal processing, to remote control underwater wireless communications. This book presents the diverse areas of underwater acoustic signal processing and communication systems through a collection of contributions from prominent researchers in these areas. Their results, both new and those published over the past few years, have been assembled to provide what we hope is a comprehensive overview of the recent developments in the field. The book is intended for a general audience of researchers, engineers and students working in the areas of underwater acoustic signal processing. It requires the reader to have a basic understanding of the digital signal processing concepts. Each topic is treated from a theoretical perspective, followed by practical implementation details. We hope that the book can serve both as a study text and an academic reference.

This book provides comprehensive coverage of the detection and processing of signals in underwater acoustics. Background material on active and passive sonar systems, underwater acoustics, and statistical signal processing makes the

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book a self-contained and valuable resource for graduate students, researchers, and active practitioners alike. Signal detection topics span a range of common signal types including signals of known form such as active sonar or communications signals; signals of unknown form, including passive sonar and narrowband signals; and transient signals such as marine mammal vocalizations. This text, along with its companion volume on beamforming, provides a thorough treatment of underwater acoustic signal processing that speaks to its author's broad experience in the field.

Sonar and Underwater Acoustics brings together all the concepts necessary for designers and users of sonar systems. Unlike other books on this subject, which are often too specialized, this book is accessible to a wider audience. The first part focuses on the acoustic environment, antenna structures, and electric acoustic interface. The latter provides knowledge required to design, as well as the development and implementation of chain processes for an active sonar from the conditioning input to output processing. The reader will find a comprehensive range of all problems encountered in underwater acoustics for a sonar application, from physical phenomena governing the environment and the corresponding constraints, through to the technical definition of transducers and antennas, and the types of signal processing involved. In one section, measures

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in underwater acoustics are also proposed.

Written in tutorial style, this textbook discusses the fundamental topics of modern day Sonar Systems Engineering for the analysis and design of both active and passive sonar systems. Included are basic signal design for active sonar systems and understanding underwater acoustic communication signals. Mathematical theory is provided, plus practical design and analysis equations for both passive and active sonar systems. Practical homework problems are included at the end of each chapter and a solutions manual and lecture slides for each chapter are available for adopting professors.

Senior level/graduate level text/reference presenting state-of-the-art numerical techniques to solve the wave equation in heterogeneous fluid-solid media. Numerical models have become standard research tools in acoustic laboratories, and thus computational acoustics is becoming an increasingly important branch of ocean acoustic science. The first edition of this successful book, written by the recognized leaders of the field, was the first to present a comprehensive and modern introduction to computational ocean acoustics accessible to students. This revision, with 100 additional pages, completely updates the material in the first edition and includes new models based on current research. It includes problems and solutions in every chapter, making the book more useful in teaching (the first edition had a separate solutions manual). The book is intended for graduate and advanced undergraduate students of

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acoustics, geology and geophysics, applied mathematics, ocean engineering or as a reference in computational methods courses, as well as professionals in these fields, particularly those working in government (especially Navy) and industry labs engaged in the development or use of propagating models.

The first book exclusively on sonar and sonar technology. Written by an engineer (with over 40 years of experience in the field) for engineers. Taking an engineering approach rather than a physics/math one it provides an understanding of the basic principles of sonar and develops the formulae and "rules of thumb" for sonar design and performance analysis.

Applied Underwater Acoustics meets the needs of scientists and engineers working in underwater acoustics and graduate students solving problems in, and preparing theses on, topics in underwater acoustics. The book is structured to provide the basis for rapidly assimilating the essential underwater acoustic knowledge base for practical application to daily research and analysis. Each chapter of the book is self-supporting and focuses on a single topic and its relation to underwater acoustics. The chapters start with a brief description of the topic's physical background, necessary definitions, and a short description of the applications, along with a roadmap to the chapter. The subtopics covered within individual subchapters include most frequently used equations that describe the topic. Equations are not derived, rather, assumptions behind equations and limitations on the applications of each equation are emphasized.

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Figures, tables, and illustrations related to the sub-topic are presented in an easy-to-use manner, and examples on the use of the equations, including appropriate figures and tables are also included. Provides a complete and up-to-date treatment of all major subjects of underwater acoustics Presents chapters written by recognized experts in their individual field Covers the fundamental knowledge scientists and engineers need to solve problems in underwater acoustics Illuminates, in shorter sub-chapters, the modern applications of underwater acoustics that are described in worked examples Demands no prior knowledge of underwater acoustics, and the physical principles and mathematics are designed to be readily understood by scientists, engineers, and graduate students of underwater acoustics Includes a comprehensive list of literature references for each chapter

Acoustic Signal Processing for Ocean Exploration has two major goals: (i) to present signal processing algorithms that take into account the models of acoustic propagation in the ocean and; (ii) to give a perspective of the broad set of techniques, problems, and applications arising in ocean exploration. The book discusses related issues and problems focused in model based acoustic signal processing methods. Besides addressing the problem of the propagation of acoustics in the ocean, it presents relevant acoustic signal processing methods like matched field processing, array processing, and localization and detection techniques. These more traditional contexts are herein enlarged to include imaging and mapping, and new signal representation

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models like time/frequency and wavelet transforms. Several applied aspects of these topics, such as the application of acoustics to fisheries, sea floor swath mapping by swath bathymetry and side scan sonar, autonomous underwater vehicles and communications in underwater are also considered.

Underwater Acoustic Modeling and Simulation, Fourth Edition continues to provide the most authoritative overview of currently available propagation, noise, reverberation, and sonar-performance models. This fourth edition of a bestseller discusses the fundamental processes involved in simulating the performance of underwater acoustic systems and emphasizes the importance of applying the proper modeling resources to simulate the behavior of sound in virtual ocean environments. New to the Fourth Edition Extensive new material that addresses recent advances in inverse techniques and marine-mammal protection Problem sets in each chapter Updated and expanded inventories of available models Designed for readers with an understanding of underwater acoustics but who are unfamiliar with the various aspects of modeling, the book includes sufficient mathematical derivations to demonstrate model formulations and provides guidelines for selecting and using the models. Examples of each type of model illustrate model formulations, model assumptions, and algorithm efficiency. Simulation case studies are also included to demonstrate practical applications. Providing a thorough source of information on modeling resources, this book examines the translation of our physical understanding of sound in the sea into mathematical models that simulate acoustic propagation, noise, and reverberation in the ocean. The text shows how these models are used to predict and diagnose the performance of complex sonar systems operating in the

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undersea environment.

"Digital Sonar Design in Underwater Acoustics Principles and Applications" provides comprehensive and up-to-date coverage of research on sonar design, including the basic theory and techniques of digital signal processing, basic concept of information theory, ocean acoustics, underwater acoustic signal propagation theory, and underwater signal processing theory. This book discusses the general design procedure and approaches to implementation, the design method, system simulation theory and techniques, sonar tests in the laboratory, lake and sea, and practical validation criteria and methods for digital sonar design. It is intended for researchers in the fields of underwater signal processing and sonar design, and also for navy officers and ocean explorers. Qihu Li is a professor at the Institute of Acoustics, Chinese Academy of Sciences, and an academician of the Chinese Academy of Sciences. This book gives a state-of-the-art overview of the hot topic of autonomous underwater vehicle (AUV) design and practice. It covers a wide range of AUV application areas such as education and research, biological and oceanographic studies, surveillance purposes, military and security applications and industrial underwater applications.

Digital Underwater Acoustic Communications focuses on describing the differences between underwater acoustic communication channels and radio channels, discusses loss of transmitted sound in underwater acoustic channels, describes digital underwater acoustic communication signal processing, and provides a comprehensive reference to digital underwater acoustic communication equipment. This book is designed to serve as a reference for postgraduate students and practicing engineers involved in the design and analysis of underwater acoustic communications systems as well as for engineers involved in underwater

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acoustic engineering. Introduces the basics of underwater acoustics, along with the advanced functionalities needed to achieve reliable communications in underwater environment Identifies challenges in underwater acoustic channels relative to radio channels, underwater acoustic propagation, and solutions Shows how multi-path structures can be thought of as time diversity signals Presents a new, robust signal processing system, and an advanced FH-SS system for multimedia underwater acoustic communications with moderate communication ranges (above 20km) and rates (above 600bps) Describes the APNFM system for underwater acoustic communication equipment (including both civil and military applications), to be employed in active sonar to improve its performance

Sensor technologies are a rapidly growing area of interest in science and product design, embracing developments in electronics, photonics, mechanics, chemistry, and biology. Their presence is widespread in everyday life, where they are used to sense sound, movement, and optical or magnetic signals. The demand for portable and lightweight sensors is relentless in several industries, from consumer electronics to biomedical engineering to the military. Smart Sensors for Industrial Applications brings together the latest research in smart sensors technology and exposes the reader to myriad applications that this technology has enabled. Organized into five parts, the book explores: Photonics and optoelectronics sensors, including developments in optical fibers, Brillouin detection, and Doppler effect analysis. Chapters also look at key applications such as oxygen detection, directional discrimination, and optical sensing. Infrared and thermal sensors, such as Bragg gratings, thin films, and microbolometers. Contributors also cover temperature measurements in industrial conditions, including sensing inside explosions. Magnetic and inductive sensors, including

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magnetometers, inductive coupling, and ferro-fluidics. The book also discusses magnetic field and inductive current measurements in various industrial conditions, such as on airplanes. Sound and ultrasound sensors, including underwater acoustic modem, vibrational spectroscopy, and photoacoustics. Piezoresistive, wireless, and electrical sensors, with applications in health monitoring, agrofood, and other industries. Featuring contributions by experts from around the world, this book offers a comprehensive review of the groundbreaking technologies and the latest applications and trends in the field of smart sensors.

Master's Thesis from the year 2014 in the subject Engineering - Naval Engineering, Ocean Engineering, , course: Electronics Systems Design, language: English, abstract: The existing underwater acoustic modems are designed for deep oceans and long range communication leading to immense consumption of power and high cost. These long range underwater acoustic modems are not suitable choice for deployment in underwater sensor networks, Hence the problem was chosen to design and develop a underwater acoustic modems that operates in shallow waters of depth below 100m and for a short range of below 100 m. Underwater wireless sensor network is contemporary technology that can be applied in the fields of security, surveillance, military, commercial, industrial and environmental. The major drawback is that the traditional underwater acoustic modems cannot be deployed for underwater sensor networks. This work focusses on the research and development of the underwater acoustic modem for shallow waters and short range communication. The relevant background theory required understand acoustics and for modelling the unique characteristics of the underwater channel is described in detail. Different concepts to model and implement the functionalities of the transmitter and receiver were explored, while converging to the most

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suitable choice of concepts. The modelled system is simulated for different channel conditions such as depth, range and induced ambient noise. The results were analysed in order to conclude the performance outcome of the system. The modelled system can efficiently operate for a depth of 30m, 50m and 70m for a range up to 50m. The hardware was developed using minimum number of components as a proof of concept for efficient data transmission and reception using acoustic signals. The hardware was tested to operate efficiently in air, however hardware tests for underwater is suggested for future work, which will provide much better performance since acoustics is more suitable for communication in water than air.

Collecting and processing data is a necessary aspect of living in a technologically advanced society. Whether it's monitoring events, controlling different variables, or using decision-making applications, it is important to have a system that is both inexpensive and capable of coping with high amounts of data. *Technological Breakthroughs in Modern Wireless Sensor Applications* brings together new ways to process and monitor data, and to put it to work in everything from intelligent transportation systems to healthcare to multimedia applications. This book is an essential reference source for research and development engineers, graduate students, academics, and researchers interested in intelligent engineering, internetworking, routing, and network planning algorithms.

This work describes design and development methodologies in underwater acoustic signal processing. The emphasis is on the implementation and experimental issues such as use of modern (DSP) systems and special hardware realizations. The book assembles a number of contributions dealing with different underwater acoustic signal processing applications. Topics covered include: array processing for detection and localization; matched-field processing;

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speech coding and transmission for divers; underwater biotelemetry; signal processing for underwater communications (telemetry); communication channel modelling; equalization for underwater high speed communications and neural networks in underwater signal processing. These proceedings are a collection of 16 selected scientific papers and reviews by distinguished international experts that were presented at the 4th Pacific Rim Underwater Acoustics Conference (PRUAC), held in Hangzhou, China in October 2013. The topics discussed at the conference include internal wave observation and prediction; environmental uncertainty and coupling to sound propagation; environmental noise and ocean dynamics; dynamic modeling in acoustic fields; acoustic tomography and ocean parameter estimation; time reversal and matched field processing; underwater acoustic localization and communication as well as measurement instrumentations and platforms. These proceedings provide insights into the latest developments in underwater acoustics, promoting the exchange of ideas for the benefit of future research.

Offering complete and comprehensive coverage of modern sonar spectrum system analysis, *Underwater Acoustics: Analysis, Design and Performance of Sonar* provides a state-of-the-art introduction to the subject and has been carefully structured to offer a much-needed update to the classic text by Urick. Expanded to include computational approaches to the topic, this book treads the line between the highly theoretical and mathematical texts and the more populist, non-mathematical books that characterize the existing literature in the field. The author compares and contrasts different techniques for sonar design, analysis and performance prediction and includes key experimental and theoretical results, pointing the reader towards further detail with extensive references. Practitioners in the field of sonar

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design, analysis and performance prediction as well as graduate students and researchers will appreciate this new reference as an invaluable and timely contribution to the field. Chapters include the sonar equation, radiated, self and ambient noise, active sonar sources, transmission loss, reverberation, transducers, active target strength, statistical detection theory, false alarms, contacts and targets, variability and uncertainty, modelling detections and tactical decision aids, cumulative probability of detection, tracking target motion analysis and localization, and design and evaluation of sonars

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