

ADVANCED TOPICS IN SCIENCE AND TECHNOLOGY IN CHINA

Qihu Li

Digital Sonar Design in Underwater Acoustics

Principles and Applications



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

Douglas A. Abraham



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Digital Sonar Design in Underwater Acoustics Qihu Li, 2012-03-05 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 **Index of**

Conference Proceedings British Library. Document Supply Centre, 1997 **Digital Underwater Acoustic Communications** Lufen Xu, Tianzeng Xu, 2016-09-16 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 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 The Advanced Sonar Course Rodney F. W. Coates, 2001 **Underwater Acoustic Digital Signal**

Processing and Communication Systems Robert Istepanian, Milica Stojanovic, 2013-03-09 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 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

Underwater Acoustic Data Processing Y. T. Chan, 1989-03-31 This book contains the papers that were accepted for presentation at the 1988 NATO Advanced Study Institute on Underwater Acoustic Data Processing held at the Royal Military College of Canada from 18 to 29 July 1988 Approximately 110 participants from various NATO countries were in attendance during this two week period Their research interests range from underwater acoustics to signal processing and computer science some are renowned scientists and some are recent Ph D graduates The purpose of the ASI was to provide an authoritative summing up of the various research activities related to sonar technology The exposition on each subject began with one or two tutorials prepared by invited lecturers followed by research papers which provided indications of the state of development in that specific area I have broadly classified the papers into three sections under the titles of I Propagation and Noise II Signal Processing and III Post Processing The reader will find in Section I papers on low frequency acoustic sources and effects of the medium on underwater acoustic propagation Problems such as coherence loss due to boundary interaction wavefront distortion and multipath transmission were addressed Besides the medium corrupting noise sources also have a strong influence on the performance of a sonar system and several researchers described methods of modeling these sources

Underwater Acoustics Richard P. Hodges, 2010-07-19 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 included 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 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 **Sonar and Underwater Acoustics** Jean-Paul Marage,Yvon Mori,2010-08-23 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 in underwater acoustics are also proposed

Underwater Acoustic Channel Junying Hui,Xueli Sheng,2022-05-19 This book introduces sonar system and acoustic channel model average energy channel coherent multipath channel the theoretical basis for the stochastic time varying space variant channel slowly time varying coherent multipath channel and reverberation channel Based on the basic theory of underwater acoustic channels and the various characteristics of the marine acoustic environment factor this textbook aims to help students understand the impact of the marine acoustic channel on the sonar system It helps students to grasp underwater acoustic signal processing principles and obtain the ability to solve practical problems in underwater acoustic channel engineering Finally it aims at laying a foundation for the further sonar system design This textbook is recommended for graduate or undergraduate students in the field of sonar signal processing underwater acoustic engineering as well as some related subjects of marine technology *Underwater Real-Time 3D Acoustical Imaging* Cheng Chi,2019-01-22 This book presents the topic of underwater real time 3 D acoustical imaging covering the theory algorithms and system design It summarizes recent advances in wideband and ultra wideband underwater real time 3 D acoustical imaging which will be very useful for developing next generation systems Through simulation techniques readers are able to quickly learn and develop practical underwater real time 3 D acoustical imaging systems of their own **Underwater Acoustic Data Processing** Y T Chan,1989 Underwater Acoustic Modeling and Simulation Paul C. Etter,2017-12-19 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 undersea environment

Acoustic Signal Processing for Ocean Exploration

J.M.F Moura, Isabel M.G. Lourtie, 2012-12-06 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 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

Advances in Underwater Acoustics

Andrzej Zak, 2017-11-22 Underwater acoustics despite the relatively short history has already found practical application in many areas of human activity It allows among others depth research data transmission and underwater observation and provides maritime transport safety and security against terrorists Moreover underwater acoustic technologies are also widely used in medicine biology and many other fields Therefore it is one of the most developing areas This book is a collection of experiences of scientists from around the world engaged in research design and construction as well as the daily use of underwater acoustic systems Giving this book in the hands of the reader we hope that it will be a treasure trove of knowledge and inspiration for further research in the field of underwater acoustics

Underwater

Acoustics

Salah Bourennane, 2012-03-28 The field of acoustic engineering has many various potential applications such as in ocean science research and homeland security This book provides cutting edge knowledge in current techniques and technologies such as the adaptive technique for underwater communication array processing and the CI OFDM system One chapter takes inspiration from the natural world in proposing a new bio inspired ranging approach for resolution purposes Technologies such as high resolution array processing methods can also be used to locate underwater objects in sediment as one chapter shows Finally two contributions cover the applications of narrowband interference suppression and iterative equalization and decoding schemes Given the scope of the book it will be required reading for researchers and engineers in

the field Underwater Acoustic Signal Processing Douglas A. Abraham, 2019 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 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 **Adaptive Methods in Underwater Acoustics** H.G. Urban, 2011-10-02 The NATO Advanced Study Institute on Adaptive Methods in Underwater Acoustics was held on 30 July 10 August 1984 in LLineburg Germany The Institute was primarily concerned with signal processing for underwater applications The majority of the presentations when taken together yield a definite picture of the present status of understanding of adaptive and high resolution processing setting out the progress achieved over the past four years together with the major problem areas remaining Major effort was made to obtain a commensurate contribution of tutorial and advanced research papers It is my hope that the material in this volume may be equally well suited for students getting an introduction to some of the basic problems in underwater signal processing and for the professionals who may obtain an up to date overview of the present state of the art This might be especially useful in view of the controversy and lack of adequate interrelationships which have marked this rapidly expanding field in the past Practical reinforcement of this picture is provided by the material concerning digital and optical processing technology giving some guidance to achievable adaptive and high resolution techniques with current processing devices The formal programme was extended and detailed by a series of six evening work shops on specific topics during which informal discussions took place among the participants Summaries of these workshops are also included in these Proceedings *Principles and Applications of Underwater Sound* United States. Office of Scientific Research and Development. National Defense Research Committee, 1946 Design, Optimization, and Applications of Underwater Acoustic Sensor Networks Bhumika Gupta, Kamal Kumar Gola, 2023-02-24 The development of underwater sensor networks opens new possibilities for maritime exploration and data collection Underwater sensor networks have a variety of military and civilian applications that must be studied further to ensure they are utilized appropriately Design Optimization and Applications of Underwater Acoustic Sensor Networks serves as a premier interdisciplinary forum for researchers practitioners and educators to present the most recent innovations trends concerns and practical challenges encountered and solutions adopted in the fields of underwater acoustic communications and underwater wireless sensor networks The book also investigates underwater sensor network applications and challenges Covering key topics such as sensor devices acoustics and environmental processing this premier reference source is ideal for engineers computer scientists industry

professionals researchers scholars academicians practitioners instructors and students **Underwater SLAM for Structured Environments Using an Imaging Sonar** David Ribas,Pere Ridao,José Neira,2010-07-26 Robotics is undergoing a major transformation in scope and dimension From a largely dominant industrial focus robotics is rapidly expanding into human environments and vigorously engaged in its new challenges Interacting with assisting serving and exploring with humans the emerging robots will increasingly touch people and their lives Beyond its impact on physical robots the body of knowledge robotics has produced is revealing a much wider range of applications reaching across diverse research areas and scientific disciplines such as biomechanics haptics neurosciences virtual simulation animation surgery and sensor networks among others In return the challenges of the new emerging areas are proving an abundant source of stimulation and insights for the field of robotics It is indeed at the intersection of disciplines that the most striking advances happen The Springer Tracts in Advanced Robotics STAR is devoted to bringing to the research community the latest advances in the robotics field on the basis of their significance and quality Through a wide and timely dissemination of critical search developments in robotics our objective with this series is to promote more exchanges and collaborations among the researchers in the community and contribute to further advancements in this rapidly growing field

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