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Handbook of Radar Signal AnalysisRadar Signal Analysis and Processing Using MATLABRadar SignalsElectronic Intelligence, the Interception of Radar SignalsFundamentals of Radar Signal ProcessingRadar Signal Processing and Its ApplicationsAspects of Radar Signal ProcessingRadar SystemsInformation–Theoretic Radar Signal ProcessingAspects of Radar Signal ProcessingFundamentals of Radar Signal Processing, Third EditionIntroduction to Radar AnalysisFundamentals of Radar Signal Processing, Second EditionKnowledge Based Radar Detection, Tracking and ClassificationRadar SignalsSignal Processing in Noise Waveform RadarFundamentals Of Radar Signal ProcessingTopics in Radar Signal ProcessingAdaptive Radar Signal ProcessingSynthetic Aperture Radar Bassem R. Mahafza Bassem R. Mahafza Charles Cook Richard G. Wiley Mark A. Richards Jian Li B. L. Lewis Paul A. Lynn Yujie Gu Bernard L. Lewis Mark A. Richards Bassem R. Mahafza Mark A. Richards Fulvio Gini Nadav Levanon Krzysztof Kulpa Richards Graham Weinberg Simon Haykin J. Patrick Fitch

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this new handbook on radar signal analysis adopts a deliberate and systematic approach it uses a clear and consistent level of delivery while maintaining strong and

easy to follow mathematical details the emphasis of this book is on radar signal types and their relevant signal processing and not on radar systems hardware or components this handbook serves as a valuable reference to a wide range of audience more specifically college level students practicing radar engineers as well as casual readers of the subject are the intended target audience of the first few chapters of this book as the book chapters progress these grow in complexity and specificity accordingly later chapters are intended for practicing engineers graduate college students and advanced readers finally the last few chapters contain several special topics on radar systems that are both educational and scientifically entertaining to all readers the presentation of topics in this handbook takes the reader on a scientific journey whose major landmarks comprise the different radar subsystems and components in this context the chapters follow the radar signal along this journey from its birth to the end of its life along the way the different relevant radar subsystems are analyzed and discussed in great detail the chapter contributors of this new handbook comprise experienced academia members and practicing radar engineers their combined years of academic and real world experiences are in excess of 175 together they bring a unique easy to follow mix of mathematical and practical presentations of the topics discussed in this book see the chapter contributors section to learn more about these individuals

offering radar related software for the analysis and design of radar waveform and signal processing radar signal analysis and processing using matlab provides a comprehensive source of theoretical and practical information on radar signals signal analysis and radar signal processing with companion matlab code aft

radar signals an introduction to theory and application introduces the reader to the basic theory and application of radar signals that are designated as large time bandwidth or pulse compression waveforms topics covered include matched filtering and pulse compression optimum predetection processing the radar ambiguity function and the linear frequency modulation waveform and matched filter parameter estimation and discrete coded waveforms are also discussed along with the effects of distortion on matched filter signals this book is comprised of 14 chapters and begins with an overview of the concepts and techniques of pulse compression matched filtering with emphasis on coding source and decoding device the discussion then turns to the derivation of the matched filter properties in order to maximize the signal to noise ratio analysis of radar ambiguity function using the principle of stationary phase parameter estimation and the method of maximum likelihood and measurement accuracies of matched filter radar signals waveform design criteria for multiple and dense target environments are also considered the final chapter describes a number

of techniques for designing microwave dispersive delays this monograph will be a useful resource for graduate students and practicing engineers in the field of radar system engineering

advances in dsp digital signal processing have radically altered the design and usage of radar systems making it essential for both working engineers as well as students to master dsp techniques this text which evolved from the author s own teaching offers a rigorous in depth introduction to today s complex radar dsp technologies contents introduction to radar systems signal models sampling and quantization of pulsed radar signals radar waveforms pulse compression waveforms doppler processing detection fundamentals constant false alarm rate cfar detection introduction to synthetic aperture imaging

radar signal processing and its applications brings together in one place important contributions and up to date research results in this fast moving area in twelve selected chapters it describes the latest advances in architectures design methods and applications of radar signal processing the contributors to this work were selected from the leading researchers and practitioners in the field this work originally published as volume 14 numbers 1 3 of the journal multidimensional systems and signal processing will be valuable to anyone working or researching in the field of radar signal processing it serves as an excellent reference providing insight into some of the most challenging issues being examined today

the rapid development of electronics and its engineering applications ensures that new topics are always competing for a place in university and polytechnic courses but it is often difficult for lecturers to find suitable books for recommendation to students particularly when a topic is covered by a short lecture module or as an option macmillan new electronics offers introductions to advanced topics the level is generally that of second and subsequent years of undergraduate courses in electronic and electrical engineering computer science and physics some of the authors will paint with a broad brush others will concentrate on a narrower topic and cover it in greater detail but in all cases the titles in the series will provide a sound basis for further reading of the specialist literature and an up to date appreciation of practical applications and likely trends the level scope and approach of the series should also appeal to practising engineers and scientists encountering an area of electronics for the first time or needing a rapid and authoritative update vii preface the basic principles of radar do not change but the design and technology of practical radar systems have developed rapidly in recent years advances in digital electronics and computing are having a major impact especially in radar signal processing and display i hope

that this book will prove a useful introduction to such developments as well as to the underlying principles of radar detection

a comprehensive introduction to the emerging research in information theoretic radar signal processing signal processing plays a pivotal role in radar systems to estimate visualize and leverage useful target information from noisy and distorted radar signals harnessing their spatial characteristics temporal features and doppler signatures the burgeoning applications of information theory in radar signal processing provide a distinct perspective for tackling diverse challenges including optimized waveform design performance bound analysis robust filtering and target enumeration information theoretic radar signal processing provides a comprehensive introduction to radar signal processing from an information theory perspective covering both fundamental principles and advanced techniques the book facilitates the integration of information theory into radar signal processing broadening the scope and improving the performance tailored to the needs of researchers and students alike it serves as a valuable resource for comprehending the information theoretic aspects of radar signal processing information theoretic radar signal processing readers will also find presentation of alternative hypotheses in adaptive radar detection detailed discussion of topics including resource management and power allocation direction of arrival doa estimation and integrated sensing and communications isac information theoretic radar signal processing is ideal for graduate students scientists researchers and engineers who work on the broad scope of radar and sonar applications including target detection estimation imaging tracking and classification using radio frequency ultrasonic and acoustic methods

a complete guide to the full spectrum of fundamental radar signal processing systems fully updated for the latest advances this thoroughly revised resource offers comprehensive coverage of foundational digital signal processing methods for both pulsed and fmcw radar developed from the author's extensive academic and professional experience fundamentals of radar signal processing third edition covers all of the digital signal processing techniques that form the backbone of modern radar systems revealing the common threads that unify them the basic tools of linear systems filtering sampling and fourier analysis are used throughout to provide a unified tutorial approach you will get end of chapter problems that reinforce and apply salient points as well as an online suite of tutorial matlab r demos and supplemental technical notes classroom instructors additionally receive a solutions manual and sample matlab tutorial demos coverage includes an introduction to radar systems signal models data acquisition and organization waveforms and pulse compression doppler processing threshold detection and cfar measurements and tracking synthetic

aperture imaging adaptive array processing and stap

introduction to radar analysis second edition is a major revision of the popular textbook it is written within the context of communication theory as well as the theory of signals and noise by emphasizing principles and fundamentals the textbook serves as a vital source for students and engineers part i bridges the gap between communication signal analysis and radar topics include modulation techniques and associated continuous wave cw and pulsed radar systems part ii is devoted to radar signal processing and pulse compression techniques part iii presents special topics in radar systems including radar detection radar clutter target tracking phased arrays and synthetic aperture radar sar many new exercise are included and the author provides comprehensive easy to follow mathematical derivations of all key equations and formulas the author has worked extensively for the u s army the u s space and missile command and other military agencies this is not just a textbook for senior level and graduates students but a valuable tool for practicing radar engineers features authored by a leading industry radar professional comprehensive up to date coverage of radar systems analysis issues easy to follow mathematical derivations of all equations and formulas numerous graphical plots and table format outputs one part of the book is dedicated to radar waveforms and radar signal processing

the most complete current guide to the signal processing techniques essential to advanced radar systems fully updated and expanded fundamentals of radar signal processing second edition offers comprehensive coverage of the basic digital signal processing techniques and technologies on which virtually all modern radar systems rely including target and interference models matched filtering waveform design doppler processing threshold detection and measurement accuracy the methods and interpretations of linear systems filtering sampling and fourier analysis are used throughout to provide a unified tutorial approach end of chapter problems reinforce the material covered developed over many years of academic and professional education this authoritative resource is ideal for graduate students as well as practicing engineers fundamentals of radar signal processing second edition covers introduction to radar systems signal models pulsed radar data acquisition radar waveforms doppler processing detection fundamentals measurements and tracking introduction to synthetic aperture imaging introduction to beamforming and space time adaptive processing

discover the technology for the next generation of radar systems here is the first book that brings together the key concepts essential for the application of knowledge

based systems kbs to radar detection tracking classification and scheduling the book highlights the latest advances in both kbs and radar signal and data processing presenting a range of perspectives and innovative results that have set the stage for the next generation of adaptive radar systems the book begins with a chapter introducing the concept of knowledge based kb radar the remaining nine chapters focus on current developments and recent applications of kb concepts to specific radar functions among the key topics explored are fundamentals of relevant kb techniques kb solutions as they apply to the general radar problem kbs applications for the constant false alarm rate processor kb control for space time adaptive processing kb techniques applied to existing radar systems integrated end to end radar signals data processing with overarching kb control all chapters are self contained enabling readers to focus on those topics of greatest interest each one begins with introductory remarks moves on to detailed discussions and analysis and ends with a list of references throughout the presentation the authors offer examples of how kbs works and how it can dramatically improve radar performance and capability moreover the authors forecast the impact of kb technology on future systems including important civilian military and homeland defense applications with chapters contributed by leading international researchers and pioneers in the field this text is recommended for both students and professionals in radar and sonar detection tracking and classification and radar resource management

a text and general reference on the design and analysis of radar signals as radar technology evolves to encompass a growing spectrum of applications in military aerospace automotive and other sectors innovations in digital signal processing have risen to meet the demand presenting a long overdue up to date dedicated resource on radar signals the authors fill a critical gap in radar technology literature radar signals features in depth coverage of the most prevalent classical and modern radar signals used today as well as new signal concepts developed in recent years inclusion of key matlab software codes throughout the book demonstrates how they dramatically simplify the process of describing and analyzing complex signals topics covered include matched filter and ambiguity function concepts basic radar signals with both analytical and numerical analysis frequency modulated and phase coded pulses complete discussion of band limiting schemes coherent lfm pulse trains the most popular radar signal diversity in pulse trains including stepped frequency pulses continuous wave signals multicarrier phase coded signals combining lucid explanation preferred signal tables matlab codes and problem sets in each chapter radar signals is an essential reference for professionals and a systematic tutorial for any seeking to broaden their knowledge base in this dynamic field

this book is devoted to the emerging technology of noise waveform radar and its signal processing aspects it is a new kind of radar which use noise like waveform to illuminate the target the book includes an introduction to basic radar theory starting from classical pulse radar signal compression and wave radar the book then discusses the properties difficulties and potential of noise radar systems primarily for low power and short range civil applications the contribution of modern signal processing techniques to making noise radar practical are emphasized and application examples are given

this rigorous text provides in depth coverage of radar signal processing from a dsp perspective filling a gap in the literature there are a number of good books on general radar systems skolnik and nathanson are the most popular there are also good monographs on advanced and specialty topics like synthetic aperture imaging but there is a large practical gap between the qualitative system books and the advanced dsp titles and that is the slot this book fills

radar has been an important topic since its introduction in a military context during world war ii due to advances in technology it has been necessary to refine the algorithms employed within the signal processing architecture hence this book provides a series of chapters examining some topics in modern radar signal processing these include synthetic aperture radar multiple input multiple output radar as well as a series of chapters examining other key issues relevant to the central theme of the book

this collaborative work presents the results of over twenty years of pioneering research by professor simon haykin and his colleagues dealing with the use of adaptive radar signal processing to account for the nonstationary nature of the environment these results have profound implications for defense related signal processing and remote sensing references are provided in each chapter guiding the reader to the original research on which this book is based

radar like most well developed areas has its own vocabulary words like doppler frequency pulse compression mismatched filter carrier frequency in phase and quadrature have specific meaning to the radar engineer in fact the word radar is actually an acronym for radio detection and rang ing even though these words are well defined they can act as road blocks which keep people without a radar background from utilizing the large amount of data literature and expertise within the radar community this is unfortunate because the use of digital radar processing techniques has made possible the analysis of radar signals on many general purpose digi tal

computers of special interest are the surface mapping radars such as the seasat and the shuttle imaging radars which utilize a technique known as synthetic aperture radar sar to create high resolution images pictures this data appeals to cartographers agronomists oceanographers and others who want to perform image enhancement parameter estimation pattern recognition and other information extraction techniques on the radar imagery the first chapter presents the basics of radar processing techniques for calculating range distance by measuring round trip propagation times for radar pulses this is the same technique that sightseers use when calculating the width of a canyon by timing the round trip delay using echoes in fact the corresponding approach in radar is usually called the pulse echo technique

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