

Synthetic Aperture Radar Signal Processing With

Fundamentals of Radar Signal Processing Fundamentals of Radar Signal Processing, Third Edition Radar Signal Analysis and Processing Using MATLAB Fundamentals of Radar Signal Processing, Second Edition Signal Processing in Noise Waveform Radar Radar Signals Radar Signal Processing and Its Applications Topics in Radar Signal Processing Digital Signal Processing Techniques and Applications in Radar Image Processing Information-Theoretic Radar Signal Processing Handbook of Radar Signal Analysis Handbook of Radar Signal Analysis Aspects of Radar Signal Processing MIMO Radar Signal Processing Introduction to Radar Analysis Radar Signal Processing and Adaptive Systems Compressed Sensing in Radar Signal Processing Radar Systems Fundamentals of Radar Signal Processing, 3E Basic Radar Analysis, Second Edition Mark A. Richards Mark A. Richards Bassem R. Mahafza Mark A. Richards Krzysztof Kulpa Charles Cook Jian Li Graham Weinberg Bu-Chin Wang Yujie Gu Bassem R. Mahafza Bassem R. Mahafza Bernard W. Lewis Jian Li Bassem R. Mahafza Ramon Nitzberg Antonio De Maio Paul A. Lynn Mark A. Richards Mervin C. Budge

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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

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

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

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

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

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

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

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

a self contained approach to dsp techniques and applications in radar imaging the processing of radar images in general consists of three major fields digital signal processing dsp antenna and radar operation and algorithms used to process the radar images this book brings together material from these different areas to allow readers to gain a thorough understanding of how radar images are processed the book is divided into three main parts and covers dsp principles and signal characteristics in both analog and digital domains advanced signal sampling and interpolation techniques antenna theory maxwell equation radiation field from dipole and linear phased array radar fundamentals radar modulation and target detection techniques continuous wave pulsed linear frequency modulation and stepped frequency modulation properties of radar images algorithms used for radar image processing simulation examples and results of satellite image files processed by range doppler and stolt interpolation algorithms the book fully utilizes the computing and graphical capability of matlab to display the signals at various processing stages in 3d and or cross sectional views additionally the text is complemented with flowcharts and system block diagrams to aid in readers comprehension digital signal processing techniques and applications in radar image processing serves as an ideal textbook for graduate students and practicing engineers who wish to gain firsthand experience in applying dsp principles and technologies to radar imaging

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

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

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

the first book to present a systematic and coherent picture of mimo radars due to its potential to improve target detection and discrimination capability multiple input and multiple output mimo radar has generated significant attention and widespread interest in academia industry government labs and funding agencies this important new work fills the need for a comprehensive treatment of this emerging field edited and authored by leading researchers in the field of mimo radar research this book introduces recent developments in the area of mimo radar to stimulate new concepts theories and applications of the topic and to foster further cross fertilization of ideas with mimo communications topical coverage includes adaptive mimo radar beampattern analysis and optimization for mimo radar mimo radar for target detection parameter estimation tracking association and recognition mimo radar prototypes and measurements space time codes for mimo radar statistical mimo radar waveform design for mimo radar written in an easy to follow tutorial style mimo radar signal processing serves as an excellent course book for graduate students and a valuable reference for researchers in academia and industry

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

a valuable resource for radar engineers and managers of all levels this revised edition provides an introduction to the capabilities and limitations of radar as well as a detailed

advanced study of key radar signal processing topics the book explains the concepts and theory of radar signal processing such as resolution ambiguities antennas waveforms the theory of detecting targets in noise and or clutter and tracking using data processing it also presents equations for the determination of maximum radar range in free space and as affected by multipath and the horizon

learn about the latest theoretical and practical advances in radar signal processing using tools from compressive sensing

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

your cutting edge introduction to radar signal processing fully updated for the latest advances this up to date guide provides in depth coverage of the full breadth of foundational radar signal processing methods of waveform design doppler processing detection tracking imaging and adaptive processing from a digital signal processing perspective the techniques of linear systems filtering sampling and fourier analysis are used throughout to provide a unified tutorial approach developed from the author s extensive academic and professional experience fundamentals of radar signal processing third edition has been revised and updated throughout readers will find the solid foundations of earlier editions enhanced with new material on such topics as keystone formatting detection in spiky clutter range migration and backprojection imaging virtual arrays ground moving target indication and many more presents complete coverage of foundational digital radar signal processing techniques integrates linear fmcw techniques of emerging fields such as automotive radar with pulsed methods includes additional homework problems in all chapters comes with an online suite of answer keys solutions manuals tutorial matlab demos and technical notes

this highly anticipated second edition of an artech house classic covers several key radar analysis areas the radar range equation detection theory ambiguity functions waveforms antennas active arrays receivers and signal processors cfar and chaff analysis readers will be able to predict the detection performance of a radar system using the radar range equation its various parameters matched filter theory and swerling target models the performance of

various signal processors single pulse pulsed doppler lfm nlfm and bpsk are discussed taking into account factors including mti processing integration gain weighting loss and straddling loss the details of radar analysis are covered from a mathematical perspective with in depth breakdowns of radar performance in the presence of clutter readers will be able to determine the nose temperature of a multi channel receiver as it is used in active arrays with the addition of three new chapters on moving target detectors inverse synthetic aperture radar isar and constant false alarm rate cfar and new matlab codes this expanded second edition will appeal to the novice as well as the experienced practitioner

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