Synthetic Aperture Radar Signal Processing With

Fundamentals of Radar Signal ProcessingFundamentals of Radar Signal Processing, Third EditionRadar Signal Analysis and Processing Using MATLABRadar Signal Processing and Its ApplicationsAspects of Radar Signal ProcessingCompressed Sensing in Radar Signal ProcessingAdaptive Radar Signal ProcessingFundamentals of Radar Signal Processing, Second EditionTopics in Radar Signal ProcessingHandbook of Radar Signal AnalysisAspects of Radar Signal ProcessingInformation-Theoretic Radar Signal ProcessingTime-frequency Transforms for Radar Imaging and Signal AnalysisRadar SignalsRadar SystemsRadar SignalsAcademic Press Library in Signal ProcessingSignal Processing in Noise Waveform RadarMIMO Radar Signal ProcessingDigital Signal Processing Techniques and Applications in Radar Image Processing Mark A. Richards Mark A. Richards Bassem R. Mahafza Jian Li B. L. Lewis Antonio De Maio Simon Haykin Mark A. Richards Graham Weinberg Bassem R. Mahafza Bernard L. Lewis Yujie Gu Victor C. Chen Charles Cook Paul A. Lynn Nadav Levanon Fulvio Gini Krzysztof Kulpa Jian Li Bu-Chin Wang

Fundamentals of Radar Signal Processing Fundamentals of Radar Signal Processing, Third Edition Radar Signal Analysis and Processing Using MATLAB Radar Signal Processing and Its Applications Aspects of Radar Signal Processing Compressed Sensing in Radar Signal Processing Adaptive Radar Signal Processing Fundamentals of Radar Signal Processing, Second Edition Topics in Radar Signal Processing Handbook of Radar Signal Analysis Aspects of Radar Signal Processing Information-Theoretic Radar Signal Processing Time-frequency Transforms for Radar Imaging and Signal Analysis Radar Signals Radar Systems Radar Signals Academic Press Library in Signal Processing Signal Processing in Noise Waveform Radar MIMO Radar Signal Processing Digital Signal Processing Techniques and Applications in Radar Image Processing *Mark A. Richards Mark A. Richards Bassem R. Mahafza Jian Li B. L. Lewis Antonio De Maio Simon Haykin Mark A. Richards Graham Weinberg Bassem R. Mahafza Bernard L. Lewis Yujie Gu Victor C. Chen Charles Cook Paul A. Lynn Nadav Levanon Fulvio Gini Krzysztof Kulpa Jian Li Bu-Chin Wang*

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

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

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

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

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

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 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

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 text explores more efficient ways to extract dispersive scattering features detect and extract weak signals in noise form clear radar images estimate parameters and perform motion compensation and detect and track moving targets in the synthetic aperture radar

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

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 recom mendation 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 intro duction to such developments as well as to the underlying principles of radar detection

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 second volume edited and authored by world leading experts gives a review of the principles methods and techniques of important and emerging research topics and technologies in communications and radar engineering with this reference source you will quickly grasp a new area of research understand the underlying principles of a topic and its application ascertain how a topic relates to other areas and learn of the research issues yet to be resolved quick tutorial reviews of important and emerging topics of research in array and statistical signal processing presents core principles and shows their application reference content on core principles technologies algorithms and applications comprehensive references to journal articles and other literature on which to build further more specific and detailed knowledge edited by leading people in the field who through their reputation have been able to commission experts to write on a particular topic

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

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

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

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