Basics Of Synthetic Aperture Radar Nasa Arset

Algorithms for Synthetic Aperture Radar ImagerySynthetic Aperture Radar Signal Processing with MATLAB AlgorithmsImage Processing and GIS for Remote SensingIntroduction to Microwave Remote SensingInverse Synthetic Aperture Radar ImagingHighly Resolved Synthetic Aperture Radar with Beam SteeringMulti-Antenna Synthetic Aperture RadarPolarimetric SAR ImagingSpotlight-Mode Synthetic Aperture Radar: A Signal Processing ApproachMulti-Antenna Synthetic Aperture RadarSynthetic Impulse and Aperture Radar (SIAR)Polarimetric Radar ImagingRemote Compositional AnalysisBasics of Polar-Format Algorithm for Processing Synthetic Aperture Radar ImagesImaging with Synthetic Aperture RadarSynthetic Aperture Radar ProcessingSynthetic Aperture Radar ProcessingSpotlight Synthetic Aperture RadarSynthetic Aperture Radar PolarimetryPrinciples of Synthetic Aperture Radar ImagingMicrowave Remote Sensing of Land SurfacesThrough-the-Wall Radar ImagingLand Applications of Radar Remote SensingSynthetic Aperture Radar Imaging Mechanism for Oil SpillsDigital Processing of Synthetic Aperture Radar DataFundamentals of Radar Signal ProcessingPolarimetric Scattering and SAR Information RetrievalOcean Remote Sensing with Synthetic Aperture RadarSmall and Short-Range Radar SystemsDesign Technology of Synthetic Aperture RadarInverse Synthetic Aperture Radar Imaging With MATLAB AlgorithmsInverse Synthetic Aperture Radar Imaging With MATLAB AlgorithmsMeter-Wave Synthetic Aperture Radar for Concealed Object DetectionTreatise on GeophysicsUnderstanding Synthetic Aperture Radar ImagesProcessing of SAR DataSynthetic Aperture RadarTarget Scattering Mechanism in Polarimetric Synthetic Aperture RadarProcessing of Synthetic Aperture Radar (SAR) ImagesTrends in Optics

Algorithms for Synthetic Aperture Radar Imagery

An up-to-date analysis of the SAR wavefront reconstruction signal theory and its digital implementation With the advent of fast computing and digital information processing techniques, synthetic aperture radar (SAR) technology has become both more powerful and more accurate. Synthetic Aperture Radar Signal Processing with MATLAB Algorithms addresses these recent developments, providing a complete, up-to-date analysis of SAR and its associated digital signal processing algorithms. This book introduces the wavefront reconstruction signal theory that underlies the best SAR imaging methods and provides clear guidelines to system design, implementation, and applications in diverse areas-from airborne reconnaissance to topographic imaging of ocean floors to surveillance and air traffic control to medical imaging techniques, and numerous others. Enabling professionals in radar signal and image processing to use synthetic aperture technology to its fullest potential, this work: * Includes M-files to supplement this book that can be retrieved from The MathWorks anonymous FTP server at ftp://ftp.mathworks.com/pub/books/soumekh * Provides practical examples and results from real SAR, ISAR, and CSAR databases * Outlines unique properties of the SAR signal that cannot be found in other information processing systems * Examines spotlight SAR, stripmap SAR, circular SAR, and monopulse SAR modalities * Discusses

classical SAR processing issues such as motion compensation and radar calibration

Synthetic Aperture Radar Signal Processing with MATLAB Algorithms

Synthetic aperture radar provides broad-area imaging at highresolutions, which is used in applications such as environmentalmonitoring, earth-resource mapping, and military systems. This book presents the tools required for the digital processing ofsynthetic aperture radar images. They are of three types: (a) theelements of physics, (b) mathematical models and (c) imageprocessing methods adapted to particular applications.

Image Processing and GIS for Remote Sensing

Written for students, remote sensing specialists, researchers and SAR system designers, Processing of SAR Data shows how to produce quality SAR images. In particular, this practical reference presents new methods and algorithms concerning the interferometric processing of SAR data with emphasis on system and signal theory, namely how SAR imagery is formed, how interferometry SAR images are created, and a detailed mathematical description of different focussing algorithms. Starting with the processing basics and progressing to the final geo-coded SAR data product, the book describes the complete processing steps in detail. Algorithms based on the effects of side-looking geometry are developed to correct foreshortening, shadowing and layover.

Introduction to Microwave Remote Sensing

Microwave Remote Sensing of Land Surface: Techniques and Methods brings essential coverage of the space techniques of observation on continental surfaces. The authors explore major applications and provide detailed chapters on physical principles, physics of measurement, and data processing for each technique, bringing readers up-to-date descriptions of techniques used by leading scientists in the field of remote sensing and Earth observation. Presents clear-and-concise descriptions of modern methods Explores current remote sensing techniques that include physical aspects of measurement (theory) and their applications Provides physical principles, measurement, and data processing chapters that are included for each technique described

Inverse Synthetic Aperture Radar Imaging

This book presents new and advanced concepts, theories and methodologies in polarimetric synthetic aperture radar (PolSAR) target scattering mechanism modeling and interpretation, which is dedicated to bridge the gap between the

acquired data and practical applications. It proposes adaptive and generalized polarimetric target decompositions, to precisely interpret the target scattering mechanisms. Further, it develops a uniform polarimetric matrix rotation theory and a polarimetric coherence pattern visualization and interpretation tool to completely explore and characterize the deep information and target signatures in the rotation domain. Finally, it demonstrates land cover classification, target detection, natural disaster damage investigation and mapping applications which use the novel scattering mechanism investigation tools. The book is a valuable resource for senior undergraduate and postgraduate students, teachers, engineers and researchers in the field of microwave remote sensing, radar polarimetry, imaging radar, and environmental studies.

Highly Resolved Synthetic Aperture Radar with Beam Steering

?The book gives an excellent theoretical and practical background of SAR in general and specifically of spotlight SAR. The rich experience of the authors in spotlight SAR processing is reflected by a very detailed summary of the associated theory as well as a lot of SAR image examples. These images illustrate the techniques described in the book and provide a valuable connection to practice. This book can be highly recommended to all scientists and engineers involved in SAR system design and SAR data evaluation.?---International Journal of Electronics and Communications

Multi-Antenna Synthetic Aperture Radar

Introduction to Microwave Remote Sensing offers an extensive overview of this versatile and extremely precise technology for technically oriented undergraduates and graduate students. This textbook emphasizes an important shift in conceptualization and directs it toward students with prior knowledge of optical remote sensing: the author dispels any linkage between microwave and optical remote sensing. Instead, he constructs the concept of microwave remote sensing by comparing it to the process of audio perception, explaining the workings of the ear as a metaphor for microwave instrumentation. This volume takes an "application-driven" approach. Instead of describing the technology and then its uses, this textbook justifies the need for measurement then explains how microwave technology addresses this need. Following a brief summary of the field and a history of the use of microwaves, the book explores the physical properties of microwaves and the polarimetric properties of electromagnetic waves. It examines the interaction of microwaves with matter, analyzes passive atmospheric and passive surface measurements, and describes the operation of altimeters and scatterometers. The textbook concludes by explaining how high resolution images are created using radars, and how techniques of interferometry can be applied to both passive and active sensors.

Polarimetric SAR Imaging

Through-the-wall radar imaging (TWRI) allows police, fire and rescue personnel, first responders, and defense forces to detect, identify, classify, and track the whereabouts of humans and moving objects. Electromagnetic waves are considered the most effective at achieving this objective, yet advances in this multi-faceted and multi-disciplinary technology require taking phenomenological issues into consideration and must be based on a solid understanding of the intricacies of EM wave interactions with interior and exterior objects and structures. Providing a broad overview of the myriad factors involved, namely size, weight, mobility, acquisition time, aperture distribution, power, bandwidth, standoff distance, and, most importantly, reliable performance and delivery of accurate information, Through-the-Wall Radar Imaging examines this technology from the algorithmic, modeling, experimentation, and system design perspectives. It begins with coverage of the electromagnetic properties of walls and building materials, and discusses techniques in the design of antenna elements and array configurations, beamforming concepts and issues, and the use of antenna array with collocated and distributed apertures. Detailed chapters discuss several suitable waveforms inverse scattering approaches and revolve around the relevance of physical-based model approaches in TWRI along with theoretical and experimental research in 3D building tomography using microwave remote sensing, high-frequency asymptotic modeling methods, synthetic aperture radar (SAR) techniques, impulse radars, airborne radar imaging of multi-floor buildings strategies for target detection, and detection of concealed targets. The book concludes with a discussion of how the Doppler principle can be used to measure motion at a very fine level of detail. The book provides a deep understanding of the challenges of TWRI, stressing its multidisciplinary and phenomenological nature. The breadth and depth of topics covered presents a highly detailed treatment of this potentially life-saving technology.

Spotlight-Mode Synthetic Aperture Radar: A Signal Processing Approach

The purpose of this report is to provide a background to Synthetic Aperture Radar (SAR) image formation using the Polar Format (PFA) processing algorithm. This is meant to be an aid to those tasked to implement real-time image formation using the Polar Format processing algorithm.

Multi-Antenna Synthetic Aperture Radar

Following the successful publication of the 1st edition in 2009, the 2nd edition maintains its aim to provide an application-driven package of essential techniques in image processing and GIS, together with case studies for demonstration and guidance in remote sensing applications. The book therefore has a "3 in 1" structure which pinpoints the intersection between these three individual disciplines and successfully draws them together in a balanced and comprehensive manner. The book conveys in-depth knowledge of image processing and GIS techniques in an accessible and comprehensive manner, with clear explanations and conceptual illustrations used throughout to enhance student learning. The

understanding of key concepts is always emphasised with minimal assumption of prior mathematical experience. The book is heavily based on the authors' own research. Many of the author-designed image processing techniques are popular around the world. For instance, the SFIM technique has long been adopted by ASTRIUM for mass-production of their standard "Pan-sharpen" imagery data. The new edition also includes a completely new chapter on subpixel technology and new case studies, based on their recent research.

Synthetic Impulse and Aperture Radar (SIAR)

The aim of this book is to demonstrate the use of SAR data in three application domains, i.e. land cover (Part II), topography (Part III), and land motion (Part IV). These are preceded by Part I, where an extensive and complete review on speckle and adaptive filtering is provided, essential for the understanding of SAR images. Part II is dedicated to land cover mapping. Part III is devoted to the generation of Digital Elevation Models based on radargrammetry and on a wise fusion (by considering sensor characteristic and acquisition geometry) of interferometric and photogrammetric elevation data. Part IV provides a contribution to three applications related to land motion.

Polarimetric Radar Imaging

The use of synthetic aperture radar (SAR) represents a new era in remote sensing technology. A complete handbook for anyone who must design an SAR system capable of reliably producing high quality image data products, free from image artifacts and calibrated in terms of the target backscatter coefficient. Combines fundamentals underlying the SAR imaging process and the practical system engineering required to produce quality images from a real SAR system. Beginning with a broad overview of SAR technology, it goes on to examine SAR system capabilities and components and detail the techniques required for design and development of the SAR ground data system with emphasis on the correlation processing. Intended for SAR system engineers and researchers, it is generously illustrated for maximum clarity.

Remote Compositional Analysis

Synthetic Aperture Radar Processing simply and methodically presents principles and techniques of Synthetic Aperture Radar (SAR) image generation by analyzing its system transfer function. The text considers the full array of operation modes from strip to scan, emphasizes processing techniques, enabling the design of operational SAR codes. A simple example then follows. This book will be invaluable to all SAR scientists and engineers working in the field. It may be used as the basis for a course on SAR image generation or as a reference book on remote sensing. It contains a wide spectrum of information presented with clarity and rigor.

Basics of Polar-Format Algorithm for Processing Synthetic Aperture Radar Images

Principles of Synthetic Aperture Radar Imaging: A System Simulation Approach demonstrates the use of image simulation for SAR. It covers the various applications of SAR (including feature extraction, target classification, and change detection), provides a complete understanding of SAR principles, and illustrates the complete chain of a SAR operation. The book places special emphasis on a ground-based SAR, but also explains space and air-borne systems. It contains chapters on signal speckle, radar-signal models, sensor-trajectory models, SAR-image focusing, platform-motion compensation, and microwave-scattering from random media. While discussing SAR image focusing and motion compensation, it presents processing algorithms and applications that feature extraction, target classification, and change detection. It also provides samples of simulation on various scenarios, and includes simulation flowcharts and results that are detailed throughout the book. Introducing SAR imaging from a systems point of view, the author: Considers the recent development of MIMO SAR technology Includes selected GPU implementation Provides a numerical analysis of system parameters (including platforms, sensor, and image focusing, and their influence) Explores wave-target interactions, signal transmission and reception, image formation, motion compensation Covers all platform motion compensation and error analysis, and their impact on final image radiometric and geometric quality Describes a ground-based SFMCW system Principles of Synthetic Aperture Radar Imaging: A System Simulation Approach is dedicated to the use, study, and development of SAR systems. The book focuses on image formation or focusing, treats platform motion and image focusing, and is suitable for students, radar engineers, and microwave remote sensing researchers.

Imaging with Synthetic Aperture Radar

Describing a field that has been transformed by the recent availability of data from a new generation of space and airborne systems, the authors offer a synthetic geometrical approach to the description of synthetic aperture radar, one that addresses physicists, radar specialists, as well as experts in image processing.

Synthetic Aperture Radar Processing

This practical reference shows SAR system designers and remote sensing specialists how to produce higher quality SAR images using data-driven algorithms, and apply powerful new techniques to measure and analyze SAR image content.

Synthetic Aperture Radar Processing

Comprehensive overview of the spectroscopic, mineralogical, and geochemical techniques used in planetary remote

sensing.

Spotlight Synthetic Aperture Radar

Modern airborne and spaceborne imaging radars, known as synthetic aperture radars (SARs), are capable of producing high-quality pictures of the earth's surface while avoiding some of the shortcomings of certain other forms of remote imaging systems. Primarily, radar overcomes the nighttime limitations of optical cameras, and the cloud- cover limitations of both optical and infrared imagers. In addition, because imaging radars use a form of coherent illumination, they can be used in certain special modes such as interferometry, to produce some unique derivative image products that incoherent systems cannot. One such product is a highly accurate digital terrain elevation map (DTEM). The most recent (ca. 1980) version of imaging radar, known as spotlight-mode SAR, can produce imagery with spatial resolution that begins to approach that of remote optical imagers. For all of these reasons, synthetic aperture radar imaging is rapidly becoming a key technology in the world of modern remote sensing. Much of the basic `workings' of synthetic aperture radars is rooted in the concepts of signal processing. Starting with that premise, this book explores in depth the fundamental principles upon which the spotlight mode of SAR imaging is constructed, using almost exclusively the language, concepts, and major building blocks of signal processing. Spotlight-Mode Synthetic Aperture Radar: A Signal Processing Approach is intended for a variety of audiences. Engineers and scientists working in the field of remote sensing but who do not have experience with SAR imaging will find an easy entrance into what can seem at times a very complicated subject. Experienced radar engineers will find that the book describes several modern areas of SAR processing that they might not have explored previously, e.g. interferometric SAR for change detection and terrain elevation mapping, or modern non-parametric approaches to SAR autofocus. Senior undergraduates (primarily in electrical engineering) who have had courses in digital signal and image processing, but who have had no exposure to SAR could find the book useful in a one-semester course as a reference.

Synthetic Aperture Radar Polarimetry

Synthetic Aperture Radar Imaging Mechanism for Oil Spills delivers the critical tool needed to understand the latest technology in radar imaging of oil spills, particularly microwave radar as a main source to understand analysis and applications in the field of marine pollution. Filling the gap between modern physics quantum theory and applications of radar imaging of oil spills, this reference is packed with technical details associated with the potentiality of synthetic aperture radar (SAR) and the key methods used to extract the value-added information necessary, such as location, size, perimeter and chemical details of the oil slick from SAR measurements. Rounding out with practical simulation trajectory movements of oil spills using radar images, this book brings an effective new source of technology and applications for today's oil and marine pollution engineers. Bridges the gap between theory and application of the techniques involving oil

spill monitoring Helps readers understand a new approach to four-dimensional automatic detection Provides advanced knowledge on image processing based on intelligent learning machine algorithms and new techniques for detection, such as quantum and multi-objective algorithms

Principles of Synthetic Aperture Radar Imaging

The recent launches of three fully polarimetric synthetic aperture radar (PolSAR) satellites have shown that polarimetric radar imaging can provide abundant data on the Earth's environment, such as biomass and forest height estimation, snow cover mapping, glacier monitoring, and damage assessment. Written by two of the most recognized leaders in this field, Polarimetric Radar Imaging: From Basics to Applications presents polarimetric radar imaging and processing techniques and shows how to develop remote sensing applications using PolSAR imaging radar. The book provides a substantial and balanced introduction to the basic theory and advanced concepts of polarimetric scattering mechanisms, speckle statistics and speckle filtering, polarimetric information analysis and extraction techniques, and applications typical to radar polarimetric remote sensing. It explains the importance of wave polarization theory and the speckle phenomenon in the information retrieval problem of microwave imaging and inverse scattering. The authors demonstrate how to devise intelligent information extraction algorithms for remote sensing applications. They also describe more advanced polarimetric analysis techniques for polarimetric target decompositions, polarization orientation effects, polarimetric scattering modeling, speckle filtering, terrain and forest classification, manmade target analysis, and PolSAR interferometry. With sample PolSAR data sets and software available for download, this self-contained, hands-on book encourages you to analyze space-borne and airborne PolSAR and polarimetric interferometric SAR (Pol-InSAR) data and then develop applications using this data.

Microwave Remote Sensing of Land Surfaces

Analyzes and discusses the operating principle, signal processing method, and experimental results of this advanced radar technology This book systematically discusses the operating principle, signal processing method, target measurement technology, and experimental results of a new kind of radar called synthetic impulse and aperture radar (SIAR). The purpose is to help readers acquire an insight into the concept and principle of the SIAR, to know its operation mode, signal processing method, the difference between the traditional radar and itself, the designing ideals, and the developing method. It includes 10 chapters. Chapter 1 gives an introduction to the basic principle of SIAR and its characteristic of four antis. Chapter 2 introduces the operating principles and system constitution of SIAR. Chapter 3 presents the main waveforms and the corresponding signal processing methods. Chapter 4 is about the long-time integration technique. Chapter 5 shows the high-accuracy measurement and tracking of 4D parameters of target in SIAR. The range-angle

coupling and decoupling are introduced in Chapter 6, where a criteria for transmit frequency optimization of array elements is studied to overcome the coupling among range, azimuth and elevation. In Chapter 7, detection and tracking of targets in strong interference background is investigated. Chapter 8 analyzes quantitatively the influence of array error on the tracking accuracy of SIAR. Expansion of impulse and aperture synthesis to HF band and microwave band are introduced respectively in Chapter 9 and Chapter 10. The operating principle of the novel bi-static surface wave radar system, as well as the experimental system and the experimental results are included in Chapter 9. Written by a highly experienced author with extensive knowledge of SIAR (Chen), the book can be used as a reference for engineering technical personnel and scientific research personnel working in the research of SIAR, MIMO radar, digital radar or other new type of radar. It can also be a reference for teachers and students in universities who engage in related professional work. Details the operating principle, signal processing method, target measurement technology, and experimental results of synthetic impulse and aperture radar (SIAR) Expands the technique of impulse and aperture synthesisfrom the VHF band to the HF band and the microwave band Written by a leading author with many years' research and practical experience in sparse array SIAR, a typical MIMO radar Engineers, researchers and postgraduates working in radar engineering will find this an invaluable resource.

Through-the-Wall Radar Imaging

Land Applications of Radar Remote Sensing

An authoritative work on Synthetic Aperture Radar system engineering, with key focus on high resolution imaging, moving target indication, and system engineering technology Synthetic Aperture Radar (SAR) is a powerful microwave remote sensing technique that is used to create high resolution two or three-dimensional representations of objects, such as landscapes, independent of weather conditions and sunlight illumination. SAR technology is a multidisciplinary field that involves microwave technology, antenna technology, signal processing, and image information processing. The use of SAR technology continues grow at a rapid pace in a variety of applications such as high-resolution wide-swath observation, multi-azimuth information acquisition, high-temporal information acquisition, 3-D terrain mapping, and image quality improvement. Design Technology of Synthetic Aperture Radar provides detailed coverage of the fundamental concepts, theories, technology, and design of SAR systems and sub-systems. Supported by the author's over two decades of research and practice experience in the field, this in-depth volume systematically describes SAR design and presents the latest research developments. Providing examination of all topics relevant to SAR—from radar and antenna system design to receiver technology and signal and image information processing—this comprehensive resource: Provides wide-ranging, up-to-date examination of all major topics related to SAR science, systems, and software Includes guidelines to conduct

grounding system designs and analysis Offers coverage of all SAR algorithm classes and detailed SAR algorithms suitable for enabling software implementations Surveys SAR and computed imaging literature of the last sixty years Emphasizes high resolution imaging, moving target indication, and system engineering Design Technology of Synthetic Aperture Radar is indispensable for graduate students majoring in SAR system design, microwave antenna, signal and information processing as well as engineers and technicians involved in SAR system techniques.

Synthetic Aperture Radar Imaging Mechanism for Oil Spills

Taking an innovative look at Synthetic Aperture Radar(SAR), this practical reference fully covers new developments inSAR and its various methodologies and enables readers to interpretSAR imagery An essential reference on polarimetric Synthetic Aperture Radar(SAR), this book uses scattering theory and radiative transfertheory as a basis for its treatment of topics. It is organized toinclude theoretical scattering models and SAR data analysistechniques, and presents cutting-edge research on theoreticalmodelling of terrain surface. The book includes quantitativeapproaches for remote sensing, such as the analysis of the Muellermatrix solution of random media, mono-static and bistatic SAR imagesimulation. It also covers new parameters for unsupervised surfaceclassification, DEM inversion, change detection from multi-temporalSAR images, reconstruction of building objects from multi-aspectSAR images, and polarimetric pulse echoes from multi-layeringscatter media. Structured to encourage methodical learning, earlier chapterscover core material, whilst later sections involve more advancednew topics which are important for researchers. The final chaptercompletes the book as a reference by covering SAR interferometry, acore topic in the remote sensing community. Features theoretical scattering models and SAR data analysistechniques Explains the simulation of SAR images for mono- and bi-staticradars, covering both qualitative and quantitative informationretrieval Chapter topics include: theoretical scattering models; SAR dataanalysis and processing techniques; and theoretical quantitativesimulation reconstruction and inversion techniques Structured to enable both academic learning and independentstudy, laying down the foundations first of all before advancing tomore complex topics Experienced author team presents mathematical derivations andfigures so that they are easy for readers to understand Pitched at graduate-level students in electrical engineering,physics, earth and space sciences, as well as researchers MATLAB code available for readers to run their ownroutines An invaluable reference for research scientists, engineers andscientists working on polarimetric SAR hardware and software,Application developers of SAR and polarimetric SAR, remote sensingspecialists working with SAR data – using ESA.

Digital Processing of Synthetic Aperture Radar Data

Anna Consortini, The President of the International Commission for Optics (ICO), has accommodated a broad spectrum of optical science topics in Trends in Optics. This book, a compilation of research reviews written by outstanding figures in the

field of optics, is aimed not only at specialists in the optical sciences, but also at scientists in other fields who might want to broaden their knowledge of optics. The latest developments in this rapidly progressing field are described, and new applications are detailed--including some previously undisclosed material on the U.S. 'Star Wars project. Authoritative and approachable, this volume should provide comprehensive insight into the ever-expanding optical sciences. Key Features * Edited by the president of the International Commission for Optics * Includes research reviews written by experts in the field * Compiles a wide range of topics in optical science

Fundamentals of Radar Signal Processing

This book is based on the latest research on ISAR imaging of moving targets and non-cooperative target recognition (NCTR). With a focus on the advances and applications, it provides readers with a working knowledge of various algorithms of ISAR imaging of targets and implementation with MATLAB.

Polarimetric Scattering and SAR Information Retrieval

This book describes the application of polarimetric syntheticaperture radar to earth remote sensing based on research at theNASA Jet Propulsion Laboratory (JPL). This book synthesizes allcurrent research to provide practical information for both thenewcomer and the expert in radar polarimetry. Thetext offers a concise description of the mathematicalfundamentals illustrated with many examples using SAR data, with amain focus on remote sensing of the earth. The book begins with basics of synthetic aperture radar toprovide the basis for understanding how polarimetric SAR images areformed and gives an introduction to the fundamentals of radarpolarimetry. It goes on to discuss more advanced polarimetricconcepts that allow one to infer more information about the terrainbeing imaged. In order to analyze data quantitatively, the signalsmust be calibrated carefully, which the book addresses in achapter summarizing the basic calibration algorithms. The bookconcludes with examples of applying polarimetric analysis toscattering from rough surfaces, to infer soil moisture from radarsignals.

Ocean Remote Sensing with Synthetic Aperture Radar

Treatise on Geophysics, Second Edition, is a comprehensive and in-depth study of the physics of the Earth beyond what any geophysics text has provided previously. Thoroughly revised and updated, it provides fundamental and state-of-the-art discussion of all aspects of geophysics. A highlight of the second edition is a new volume on Near Surface Geophysics that discusses the role of geophysics in the exploitation and conservation of natural resources and the assessment of degradation of natural systems by pollution. Additional features include new material in the Planets and Moon, Mantle

Dynamics, Core Dynamics, Crustal and Lithosphere Dynamics, Evolution of the Earth, and Geodesy volumes. New material is also presented on the uses of Earth gravity measurements. This title is essential for professionals, researchers, professors, and advanced undergraduate and graduate students in the fields of Geophysics and Earth system science. Comprehensive and detailed coverage of all aspects of geophysics Fundamental and state-of-the-art discussions of all research topics Integration of topics into a coherent whole

Small and Short-Range Radar Systems

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

Design Technology of Synthetic Aperture Radar

Inverse Synthetic Aperture Radar Imaging With MATLAB Algorithms

Synthetic Aperture Radar Processing simply and methodically presents principles and techniques of Synthetic Aperture Radar (SAR) image generation by analyzing its system transfer function. The text considers the full array of operation modes from strip to scan, emphasizes processing techniques, enabling the design of operational SAR codes. A simple example then follows. This book will be invaluable to all SAR scientists and engineers working in the field. It may be used as the basis for a course on SAR image generation or as a reference book on remote sensing. It contains a wide spectrum of information presented with clarity and rigor.

Inverse Synthetic Aperture Radar Imaging With MATLAB Algorithms

Synthetic aperture radar (SAR) is a well-known remote sensing technique, but conventional single-antenna SAR is inherently limited by the minimum antenna area constraint. Although there are still technical issues to overcome, multi-antenna SAR offers many benefits, from improved system gain to increased degrees-of-freedom and system flexibility. Multi-Antenna Synthetic Aperture Radar explores the potential and challenges of using multi-antenna SAR in microwave remote sensing

applications. These applications include high-resolution imaging, wide-swath remote sensing, ground moving target indication, and 3-D imaging. The book pays particular attention to the signal processing aspects of various multi-antenna SAR from a top-level system perspective. Explore Recent Extensions of Synthetic Aperture Radar Systems The backbone of the book is a series of innovative microwave remote sensing approaches developed by the author. Centered around multi-antenna SAR imaging, these approaches address specific challenges and potential problems in future microwave remote sensing. Chapters examine single-input multiple-output (SIMO) multi-antenna SAR, including azimuth and elevation multi-antenna SAR, and multiple-input multiple-output (MIMO) SAR. The book details the corresponding system scheme, signal models, time/phase/spatial synchronization methods, and high-precision imaging algorithms. It also investigates their potential applications. Introductory Tutorials and Novel Approaches in Multi-Antenna SAR Imaging Rigorous and self-contained, this is a unique reference for researchers and industry professionals working with microwave remote sensing, SAR imaging, and radar signal processing. In addition to novel approaches, the book also presents tutorials that serve as an introduction to multi-antenna SAR imaging for those who are new to the field.

Meter-Wave Synthetic Aperture Radar for Concealed Object Detection

This book provides a full representation of Inverse SyntheticAperture Radar (ISAR) imagery, which is a popular and importantradar signal processing tool. The book covers all possible aspectsof ISAR imaging. The book offers a fair amount of signal processingtechniques and radar basics before introducing the inverse problemof ISAR and the forward problem of Synthetic Aperture Radar (SAR).Important concepts of SAR such as resolution, pulse compression andimage formation are given together with associated MATLAB codes. After providing the fundamentals for ISAR imaging, the bookgives the detailed imaging procedures for ISAR imaging withassociated MATLAB functions and codes. To enhance the image qualityin ISAR imaging, several imaging tricks and fine-tuning proceduressuch as zero-padding and windowing are also presented. Finally,various real applications of ISAR imagery, like imaging theantenna-platform scattering, are given in a separate chapter. Forall these algorithms, MATLAB codes and figures are included. Thefinal chapter considers advanced concepts and trends in ISARimaging.

Treatise on Geophysics

Synthetic aperture radar (SAR) is a well-known remote sensing technique, but conventional single-antenna SAR is inherently limited by the minimum antenna area constraint. Although there are still technical issues to overcome, multi-antenna SAR offers many benefits, from improved system gain to increased degrees-of-freedom and system flexibility. Multi-Antenna Synthetic Aperture Radar explores the potential and challenges of using multi-antenna SAR in microwave remote sensing applications. These applications include high-resolution imaging, wide-swath remote sensing, ground moving target

indication, and 3-D imaging. The book pays particular attention to the signal processing aspects of various multi-antenna SAR from a top-level system perspective. Explore Recent Extensions of Synthetic Aperture Radar Systems The backbone of the book is a series of innovative microwave remote sensing approaches developed by the author. Centered around multi-antenna SAR imaging, these approaches address specific challenges and potential problems in future microwave remote sensing. Chapters examine single-input multiple-output (SIMO) multi-antenna SAR, including azimuth and elevation multi-antenna SAR, and multiple-input multiple-output (MIMO) SAR. The book details the corresponding system scheme, signal models, time/phase/spatial synchronization methods, and high-precision imaging algorithms. It also investigates their potential applications. Introductory Tutorials and Novel Approaches in Multi-Antenna SAR Imaging Rigorous and self-contained, this is a unique reference for researchers and industry professionals working with microwave remote sensing, SAR imaging, and radar signal processing. In addition to novel approaches, the book also presents tutorials that serve as an introduction to multi-antenna SAR imaging for those who are new to the field.

Understanding Synthetic Aperture Radar Images

The ocean covers approximately 71% of the Earth's surface, 90% of the biosphere and contains 97% of Earth's water. The Synthetic Aperture Radar (SAR) can image the ocean surface in all weather conditions and day or night. SAR remote sensing on ocean and coastal monitoring has become a research hotspot in geoscience and remote sensing. This book--Progress in SAR Oceanography--provides an update of the current state of the science on ocean remote sensing with SAR. Overall, the book presents a variety of marine applications, such as, oceanic surface and internal waves, wind, bathymetry, oil spill, coastline and intertidal zone classification, ship and other man-made objects' detection, as well as remotely sensed data assimilation. The book is aimed at a wide audience, ranging from graduate students, university teachers and working scientists to policy makers and managers. Efforts have been made to highlight general principles as well as the state-of-the-art technologies in the field of SAR Oceanography.

Processing of SAR Data

This unique resource presents the principles of meter wave ground imaging radar focusing on foliage penetration. Scattering of VHF/UHF radar signals are presented including the basic laws of electromagnetism, homogeneous media, media discontinuities/non-flat media discontinuities, and ground reflectivity. The book introduces meter wavelength synthetic aperture radar, bandwidth, and SAR imaging principles, including moving objects and also compares collected SAR data. Meter wavelength SAR system design and processing is explored, highlighting low frequency SAR design aspects, characterization of additive noise, antenna system basics, waveforms and emission adaptation which is critical material to the advancement in sensors and signal processing for below ground imaging by the energy industry and governments

worldwide. The FFBP method of processing, explicit treatment of base 2 FFBP is explained along with motion errors sensitivity and motion estimation methods. The book also explains the Bayesian change detection, covariance moving target extraction and polarimetric subsurface imaging.

Synthetic Aperture Radar

Radar polarimetry has been highly sought after for its use in the precise monitoring of Earth's surface. Polarimetric SAR Imaging explains the basic concepts of polarimetry and its diverse applications including: deforestation, tree classification, landslide detection, tsunamis, volcano eruptions and ash distribution, snow accumulation, rice field monitoring, urban area exploration, ship detection, among other applications. The explanations use actual data sets taken by Advanced Land Observing Satellite (ALOS and ALOS2). With the increasing problems presented by climate change, there is a growing need for detailed earth observation using polarimetric data. As the treatment of vector nature of radar waves is complex, there is a gap between the theory and the application. Polarimetric SAR Imaging: Theory and Applications addresses and fills this gap. Features: Provides cutting-edge polarimetric applications for earth observation with full color images. Includes detailed descriptions of theory, equations, expansions, and flowcharts, and numerous real examples. Explains concepts, data analysis, and applications in simple and clear language aimed at an intuitive comprehension. Provides specific and unique examples of PolSAR images derived from actual space and airborne systems (ALOS/ALOS2, PiSAR-x/L) Covers the wide range of the radar polarimetry, especially the decomposition of the polarimetry data, an original method developed by the author using the Japanese polarimetric SAR data Illustrated in full color using images generated by polarimetric techniques, this book is easy to understand and use for both student and expert, and is an excellent resource both in the classroom and in the field.

Target Scattering Mechanism in Polarimetric Synthetic Aperture Radar

Processing of Synthetic Aperture Radar (SAR) Images

Radar Expert, Esteemed Author Gregory L. Charvat on CNN and CBS Author Gregory L. Charvat appeared on CNN on March 17, 2014 to discuss whether Malaysia Airlines Flight 370 might have literally flown below the radar. He appeared again on CNN on March 20, 2014 to explain the basics of radar, and he explored the hope and limitations of the technology involved in the search for Flight 370 on CBS on March 22, 2014. Get His Book Now Coupling theory with reality, from derivation to implementation of actual radar systems, Small and Short-Range Radar Systems analyzes and then provides design procedures and working design examples of small and short-range radar systems. Discussing applications from automotive

to through-wall imaging, autonomous vehicle, and beyond, the practical text supplies high-level descriptions, theoretical derrivations, back-of-envelope calculations, explanations of processing algorithms, and case studies for each type of small radar system covered, including continuous wave (CW), ultrawideband (UWB) impulse, linear frequency modulation (FM), linear rail synthetic aperture radar (SAR), and phased array. This essential reference: Explains how to design your own radar devices Demonstrates how to process data from small radar sensors Provides real-world, measured radar data to test algorithms before investing development time Complete with downloadable MATLAB® scripts and actual radar measurements, Small and Short-Range Radar Systems empowers you to rapidly develop small radar technology for your application.

Trends in Optics

This book provides a full representation of Inverse Synthetic Aperture Radar (ISAR) imagery, which is a popular and important radar signal processing tool. The book covers all possible aspects of ISAR imaging. The book offers a fair amount of signal processing techniques and radar basics before introducing the inverse problem of ISAR and the forward problem of Synthetic Aperture Radar (SAR). Important concepts of SAR such as resolution, pulse compression and image formation are given together with associated MATLAB codes. After providing the fundamentals for ISAR imaging, the book gives the detailed imaging procedures for ISAR imaging with associated MATLAB functions and codes. To enhance the image quality in ISAR imaging, several imaging tricks and fine-tuning procedures such as zero-padding and windowing are also presented. Finally, various real applications of ISAR imagery, like imaging the antenna-platform scattering, are given in a separate chapter. For all these algorithms, MATLAB codes and figures are included. The final chapter considers advanced concepts and trends in ISAR imaging.

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