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# **Bistatic SAR/GISAR/FISAR Geometry, Signal Models and Imaging Algorithms**

**Andon Dimitrov Lazarov  
Todor Pavlov Kostadinov**

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# Bistatic Sar Isar Fsr Theory Algorithms And Program Implementation

**Mehrdad Soumekh**

## **Bistatic Sar Fsr Theory Algorithms And Program Implementation:**

**Bistatic SAR / GISAR / FISAR Geometry, Signal Models and Imaging Algorithms** Andon Dimitrov Lazarov, Todor Pavlov Kostadinov, 2014-01-07 Bistatic radar consists of a radar system which comprises a transmitter and receiver which are separated by a distance comparable to the expected target distance. This book provides a general theoretical description of such bistatic technology in the context of synthetic aperture inverse synthetic aperture and forward scattering radars from the point of view of analytical geometrical and signal formation as well as processing theory. Signal formation and image reconstruction algorithms are developed with the application of high informative linear frequency and phase code modulating techniques and numerical experiments that confirm theoretical models are carried out. The authors suggest the program implementation of developed algorithms. A theoretical summary of the latest results in the field of bistatic radars is provided before applying an analytical geometrical description of scenarios of bistatic synthetic aperture inverse synthetic aperture and forward scattering radars with cooperative and non-cooperative transmitters. Signal models with linear frequency and phase code modulation are developed and special phase modulations with C/A coarse acquisition and P precision of GPS satellite transmitters are considered. The authors suggest Matlab implementations of all geometrical models and signal formation and processing algorithms.

Contents 1 Bistatic Synthetic Aperture Radar BSAR Survey 2 BSAR Geometry 3 BSAR Waveforms and Signal Models 4 BSAR Image Reconstruction Algorithms 5 Analytical Geometrical Determination of BSAR Resolution 6 BSAR Experimental Results 7 BSAR Matlab Implementation A general theoretical description of bistatic technology within the scope of synthetic aperture inverse synthetic aperture and forward scattering radars from the point of view of analytical geometrical and signal formation and processing theory. Signal formation and image reconstruction algorithms are developed in this title with application of high informative linear frequency and phase code modulating techniques. Numerical experiments that confirm theoretical models are carried out and the authors suggest program implementation for the algorithms developed.

**Bistatic SAR Data Processing Algorithms** Xiaolan Qiu, Chibiao Ding, Donghui Hu, 2013-04-05 BISTATIC SAR DATA PROCESSING ALGORITHMS Synthetic Aperture Radar SAR is critical for remote sensing. It works day and night in good weather or bad. Bistatic SAR is a new kind of SAR system where the transmitter and receiver are placed on two separate platforms. Bistatic SAR is one of the most important trends in SAR development as the technology renders SAR more flexible and safer when used in military environments. Imaging is one of the most difficult and important aspects of bistatic SAR data processing. Although traditional SAR signal processing is fully developed, bistatic SAR has a more complex system structure so signal processing is more challenging. Focusing on imaging aspects of bistatic SAR signal processing, this book covers resolution analysis, echo generation methods, imaging algorithms, imaging parameter estimation and motion compensation methods. Gives a general and updated framework for image formation using signal processing aspects. Starts with an introduction to traditional SAR before moving on to more advanced topics. Offers readers a

range of exhaustive tools to process signals and form images Provides a solid reference for the imaging of other complicated SAR MATLAB codes are available from the book s companion site The book is ideal for researchers and engineers in SAR signal and data processing as well as those working in bistatic and multistatic radar imaging and in the radar sciences Graduate students with a background in radar who are interested in bistatic and multistatic radar will find this book a helpful reference

**Bistatic SAR System and Signal Processing Technology** Robert Wang,Yunkai Deng,2017-12-26 This book reports the latest results in the study of Bistatic Multistatic SAR system and signal processing techniques Novel research ideas and experimental verification have been collected on all kinds of configurations of Bistatic Multistatic SAR system including the preliminary construction of system model imaging algorithm design mission design and the corresponding application representations etc Handy well prepared tables are provided for readers quick reference and the practical design of an interferometric SAR system is illustrated step by step The book will be of interest to university researchers R D engineers and graduate students in Remote Sensing who wish to learn the core principles methods algorithms and applications of Bistatic Multistatic SAR system

### **Synthetic Aperture Radar Signal Processing with MATLAB**

**Algorithms** Mehrdad Soumekh,1999-04-27 An up to date analysis of the SAR waveform 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 waveform 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

### **Bistatic SAR Clutter Suppression**

Zhongyu Li,Junjie Wu,Jianyu Yang,Zhutian Liu,2022-03-31 This book reports the latest results in the study of clutter suppression and signal processing techniques and focuses on the analysis of non stationary characteristics of bistatic SAR clutter DPCA based clutter suppression method optimization based clutter suppression method sparse recovery based clutter suppression method experimental verification and many other aspects i e including the research results of realization technology and experimental verification Bistatic SAR clutter suppression is the prerequisite and key technique for realizing

the detection of moving targets on the ground sea surface It is also the frontier and difficult issue of international research in the field of radar Researchers engineers and graduate students in radar signal processing can benefit from this book who wish to learn the core theories methods and applications of bistatic SAR technologies *Polar Format Algorithm with Phase Correction for Bistatic SAR* ,2005 Bistatic radars are well known for their distinct advantages like spatial diversity and stealthness that monostatic radars cannot provide Recently there is an increased interest in Bistatic Synthetic Aperture Radars Polar Format Algorithm PFA is a fast and very effective algorithm for Bistatic SAR imaging In this dissertation work we have extended Polar format algorithm for Bistatic airborne SAR system A generalized system model for Bistatic SAR data collection is introduced One of the problems we encounter in reality is the non linear flight path during SAR data collection In our model we have explicitly considered these errors From the received data we first form the image by Polar Format algorithm We then find the phase error due to the approximation used in PFA Motion compensation for non linear flight path is usually made using the Global Positioning System GPS data We have shown that the approximation errors in PFA can be combined with motion errors and can be corrected together Hence without any additional computations the resultant image is free from phase errors due to PFA Abstract shortened by UMI

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