

1. Record Nr.	UNINA9910483298603321
Autore	Yang Ruliang
Titolo	Polarimetric microwave imaging // Ruliang Yang [and five others]
Pubbl/distr/stampa	Gateway East, Singapore : , : Springer, , [2021] ©2021
ISBN	981-15-8897-X
Descrizione fisica	1 online resource (611 pages)
Disciplina	621.3678
Soggetti	Polarimetric remote sensing
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Foreword -- Preface -- Brief Introduction -- Contents -- About the Authors -- Acronyms -- 1 Introduction -- 1.1 Polarization Synthetic Aperture Radar System -- 1.1.1 Development of Polarization SAR System [1, 2] -- 1.1.2 Polarization SAR Hierarchy and Operating Architecture [37, 16] -- 1.1.3 Polarization Synthetic Aperture Radar Interferometry (PolInSAR) [58] -- 1.1.4 Compact Polarization SAR [74, 75] -- 1.1.5 Polarization SAR Calibration Technology [82, 83] -- 1.2 Polarization SAR Data Processing -- 1.2.1 Statistical Properties Analysis of Polarization SAR Image -- 1.2.2 Polarization SAR Image Speckle Suppression -- 1.2.3 Polarization SAR Image Enhancement -- 1.2.4 Polarization SAR Target Decomposition -- 1.2.5 Polarization SAR Target Detection -- 1.2.6 Polarization SAR Image Classification -- 1.3 Applications of Polarization SAR -- 1.3.1 Surface Parameter Inversion of Polarization SAR Data -- 1.3.2 Information Processing of Polarization Interference SAR -- 1.3.3 Information Processing of Compact Polarization SAR and Compact Polarization SAR Interferometry -- 1.3.4 Effect of Terrain Azimuth Slope on Polarization SAR -- 1.4 Book Content Arrangement -- References -- 2 Theoretical Basics of Polarization Synthetic Aperture Radar -- 2.1 Theory of Electromagnetic Wave -- 2.1.1 The Characteristics of Electromagnetic Wave and Maxwell Equations -- 2.1.2 The Electromagnetic Wave Propagation -- 2.2 Polarization Characteristics and Representations of Electromagnetic Waves [3, 4] -- 2.2.1 Polarization Ellipse -- 2.2.2 Jones Vector and Polarization Ratio --

2.2.3 Stokes Vector and Poincare Sphere -- 2.3 Representations of Partially Polarized Electromagnetic Waves -- 2.4 Transmitting and Receiving of Electromagnetic Wave and Antenna [3, 4] -- 2.4.1 Transmitting of Electromagnetic Wave -- 2.4.2 Receiving of Fully Polarization Electromagnetic Wave. 2.4.3 Receiving of Partially Polarization Wave -- 2.4.4 Polarization Matching of Antenna -- 2.5 Representations of Polarization Scattering Characteristics [4, 5] -- 2.5.1 FSA-BSA Convention -- 2.5.2 Representation of Coherently Scattering Targets-Scattering Matrix -- 2.5.3 Representation of Depolarization Target -- 2.6 Polarization Basis Transformation [6, 7] -- 2.7 Polarization Synthesis and Polarization Signatures [8-10] -- 2.7.1 Polarization Synthesis and Polarization Signatures -- 2.7.2 Scattering Model and Polarization Signatures -- 2.8 Conclusion -- References -- 3 Polarimetric Synthetic Aperture Radar -- 3.1 The Principle of Synthetic Aperture Radar -- 3.2 Polarization Hierarchy of Polarimetric Synthetic Aperture Radar -- 3.3 The System Parameters of Polarization Synthetic Aperture Radar -- 3.3.1 The Technical Parameters of Polarization Synthetic Aperture Radar -- 3.3.2 The Polarization Characteristic Parameters -- 3.4 The Operating Architectures of Polarization Synthetic Aperture Radar -- 3.4.1 The Time-Division Multiplexing Pulses -- 3.4.2 The Frequency-Division Multiplexing Pulses -- 3.4.3 The Code-Division Multiplexing Pulses -- 3.4.4 The Space-Division Twin-Bursts in Azimuth -- 3.4.5 Compact Polarimetry Synthetic Aperture Radar -- 3.4.6 Conclusion -- References -- 4 Polarimetric Interferometric Synthetic Aperture Radar -- 4.1 Overview -- 4.2 Basic Principles of Polarimetric Interferometric SAR -- 4.2.1 Basic Principles of Interferometric SAR Measurement -- 4.2.2 Decoherence Effect of Interferometric SAR Measurement -- 4.2.3 Interferometric SAR Measurement Error Analysis -- 4.2.4 Interferometric SAR Data Processing Flow -- 4.3 Scalar Interference and Vector Interference -- 4.4 The Theory of Polarization Interference Coherence Optimization -- 4.4.1 Amplitude Coherent Optimal Algorithm -- 4.4.2 Phase Coherent Optimal Algorithm. 4.5 Coherent Scattering Decomposition -- 4.6 Coherent Region Theory of Polarization Interference SAR -- 4.6.1 Coherent Region Theory -- 4.6.2 Coherent Region Shape Parameter Extraction -- 4.7 Summary -- References -- 5 Compact Polarimetry SAR and Compact Polarimetric SAR Interferometry -- 5.1 Overview -- 5.2 Compact Polarimetric SAR Modes -- 5.3 Reconstruction of Full Polarimetric Data from Compact Polarimetric Data -- 5.3.1 Effect of Symmetry Properties of Geophysical Media -- 5.3.2 Reconstruction of FP Data Using Reflection Symmetry Properties -- 5.3.3 Reconstruction of FP Data from /4 Mode CP Data -- 5.3.4 Reconstruction of FP Data from DCP Mode CP Data -- 5.3.5 Reconstruction of FP Data from CTRLR Mode CP Data -- 5.3.6 Experiments and Result Analysis -- 5.4 Analysis of the Classification of Compact PolSAR -- 5.4.1 The Classification Scheme of Compact PolSAR -- 5.4.2 Experiment Results and Analysis -- 5.5 Compact Polarimetric SAR Interferometry -- 5.6 Reconstruction of Quad PolInSAR Covariance Matrix from Compact PolInSAR Data -- 5.6.1 Reconstruction from /4 Mode Compact POLInSAR Covariance Matrix -- 5.6.2 Reconstruction from DCP Mode Compact POLInSAR Covariance Matrix -- 5.6.3 Reconstruction from CTRLR Mode Compact POLInSAR Covariance Matrix -- 5.6.4 Experiment Results and Analysis -- 5.7 Coherence Optimization of Compact PolInSAR Data -- 5.7.1 Amplitude Coherence Optimization of Compact PolInSAR -- 5.7.2 Phase Coherence Optimization of Compact PolInSAR -- 5.7.3 Experiment Results and Analysis -- References -- 6 Polarization Calibration Technology for Polarimetric Synthetic Aperture Radar -- 6.1 Synthetic

Aperture Radar Calibration Technology -- 6.1.1 Error Sources for Synthetic Aperture Radar Systems [1] -- 6.1.2 Related Concepts of SAR Calibration Technology [1] -- 6.1.3 Calibration Model of Synthetic Aperture Radar System.

6.1.4 Internal Calibration of Synthetic Aperture Radar Systems -- 6.1.5 External Calibration of Synthetic Aperture Radar Systems [1] -- 6.2 Multi-polarization Synthetic Aperture Radar Calibration Technology -- 6.2.1 Polarization Synthetic Aperture Radar System Calibration Model -- 6.2.2 Basic Method for Calibration of Polarimetric Synthetic Aperture Radar System -- 6.3 Internal Calibration of Polarimetric Synthetic Aperture Radar Systems -- 6.3.1 Analysis of Internal Calibration Path in Polarimetric Synthetic Aperture Radar System -- 6.3.2 Crosstalk Analysis of a Polarimetric Synthetic Aperture Radar System -- 6.3.3 Calibration of Channel Crosstalk and Unbalance in a Polarimetric Synthetic Aperture Radar System -- 6.4 External Calibration Algorithm for Polarimetric Synthetic Aperture Radar System -- 6.4.1 Calibration Algorithm for Mixed Point Targets and Distributed Targets-van Zyl Algorithm -- 6.4.2 Uniform Algorithm for Polarization Data Phase and Crosstalk Calibration-Quegan Calibration Method -- 6.4.3 Distribution Target Calibration Algorithm-Sarabandi Algorithm -- 6.4.4 Polarimetric Synthetic Aperture Radar Posteriori Calibration Method -- 6.4.5 Point Target Calibration Algorithm-Whitt Algorithm -- 6.4.6 JPL Polarization Calibration Method -- 6.5 Applicable Conditions and Accuracy Analysis of Polarimetric Synthetic Aperture Radar External Calibration Algorithm -- 6.5.1 Applicable Conditions and Accuracy Analysis of Mixed Point Target and Distribution Target Calibration Algorithm -- 6.5.2 Accuracy Analysis of the Distribution Target Calibration Algorithm -- 6.5.3 Accuracy Analysis of Point Target Calibration Algorithm -- 6.6 Summary -- References -- 7 Analysis of Polarimetric Synthetic Aperture Radar Image -- 7.1 Basic Analysis Methods for Polarimetric Synthetic Aperture Radar Image.

7.1.1 Figures of Total Polarization Power (Span) and Basic Polarization Combination -- 7.1.2 Analysis Method Based on Polarization Synthesis -- 7.1.3 Analysis Method Based on Polarization Feature Map -- 7.1.4 Echo Power Ratio Under Different Polarization Combinations -- 7.1.5 Polarization Purity Analysis of Echo -- 7.1.6 Power Fluctuation Coefficient and Partial Polarization Coefficient -- 7.2 Representation Method of Multi-frequency Multi-polarized Synthetic Aperture Radar Image -- 7.2.1 Color Synthesis of Multi-polarized Combined Images -- 7.2.2 Color Synthesis of Multi-band Multi-polarized Synthetic Aperture Radar Images -- 7.3 Correlation Analysis of Multi-polarized Synthetic Aperture Radar Images -- 7.4 Optimal Polarization Analysis of Multi-polarized Synthetic Aperture Radar Data -- 7.4.1 Solution of Target Optimal Polarization -- 7.4.2 Extreme Value Analysis of Target Polarization -- 7.4.3 Dynamic Range Analysis of Target Polarization Degree -- 7.5 Summary -- References -- 8 Statistical Characteristics of Polarimetric SAR -- 8.1 Statistical Analysis of Single-Look SAR Images -- 8.2 Statistical Analysis of Single-Look Polarimetric SAR Data -- 8.2.1 Statistical Characteristics Analysis of Cross-Polarization Terms -- 8.2.2 Statistical Characteristics Analysis of the Co-polarization Term -- 8.3 Statistical Characteristics of Multi-look Polarimetric SAR Images -- 8.3.1 Covariance Matrix of Multi-look Polarimetric SAR Data and Its Statistical Distribution -- 8.3.2 Statistical Distribution of Phase Difference in Multi-look Polarimetric SAR Images -- 8.3.3 Statistical Distribution of Multi-look Polarimetric SAR Image Amplitude Product -- 8.3.4 Joint Probability Distribution of Two-Channel Echo Power in Multi-look Polarimetric SAR -- 8.3.5 Probability Distribution of Two-Channel Echo Power Ratio for Multi-look Polarimetric SAR.

8.3.6 Probability Distribution of Amplitude Ratio for Two-Channel Echo in Multi-look Polarimetric SAR.
