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-- 3.3. The Sinclair Matrix. -- 3.4. Matrices With Relative Phase. -- 3.5. FSA-BSA Conventions. -- 3.6. Relationship Between Jones and Sinclair Matrices. -- 3.7. Scattering with Circular Wave Components. -- 3.8. Backscattering. -- 3.9. Polarization Ratio of the Scattered Wave. -- 3.10. Change of Polarization Basis: The Scattering Matrix. -- 3.11. Polarizations for Maximum and Minimum Power. -- 3.12. The Polarization Fork. -- 3.13. Nonaligned Coordinate Systems. -- 3.14. Determination of Scattering Parameters. -- References. -- Problems. -- 4. AN INTRODUCTION TO RADAR. -- 4.1. Pulse Radar. -- 4.2. CW Radar. -- 4.3. Directional Properties of Radar Measurements. -- 4.4. Resolution. -- 4.5. Imaging Radar. -- 4.6. The Traditional Radar Equation. -- 4.7. The Polarimetric Radar Equation. -- 4.8. A Polarimetric Radar. -- 4.9. Noise. -- References. -- Problems. -- 5. SYNTHETIC APERTURE RADAR. -- 5.1. Creating a Terrain Map. -- 5.2. Range Resolution. -- 5.3. Azimuth Resolution. -- 5.4. Geometric Factors. -- 5.5. Polarimetric SAR. -- 5.6. SAR Errors. -- 5.7. Height Measurement. -- 5.8. Polarimetric Interferometry. -- 5.9. Phase Unwrapping. -- References. -- Problems. -- 6. PARTIALLY POLARIZED WAVES. -- 6.1. Representation of the Fields. -- 6.2. Representation of Partially Polarized Waves. -- 6.3. Reception of Partially Polarized Waves. -- References. -- Problems. -- 7. SCATTERING BY DEPOLARIZING TARGETS. -- 7.1. Targets. -- 7.2. Averaging the Sinclair Matrix. -- 7.3. The Kronecker-Product Matrices. -- 7.4. Matrices for a Depolarizing Target: Coherent Measurement. -- 7.5. Incoherently Measured Target Matrices. -- 7.6. Matrix Properties and Relationships. -- 7.7. Modified Matrices. -- 7.8. Names. -- 7.9. Additional Target Information. -- 7.10. Target Covariance and Coherency Matrices. -- 7.11. A Scattering Matrix with Circular Components. -- 7.12. The Graves Power Density Matrix. -- 7.13. Measurement Considerations. -- 7.14. Degree of Polarization and Polarimetric Entropy. -- 7.15. Variance of Power. -- 7.16. Summary of Power Equations and Matrix Relationships. -- References. -- Problems. -- 8. OPTIMAL POLARIZATIONS FOR RADAR. -- 8.1. Antenna Selection Criteria. -- 8.2. Lagrange Multipliers. -- A. COHERENTLY SCATTERING TARGETS. -- 8.3. Maximum Power. -- 8.4. Power Contrast: Backscattering. -- B. DEPOLARIZING TARGETS. -- 8.5. Iterative Procedure for Maximizing Power Contrast. -- 8.6. The Backscattering Covariance Matrix. -- 8.7. The Bistatic Covariance Matrix. -- 8.8. Maximizing Power Contrast by Matrix Decomposition. -- 8.9. Optimization with the Graves Matrix. -- References. -- Problems. -- 9. CLASSIFICATION OF TARGETS. -- A. CLASSIFICATION CONCEPTS. -- 9.1. Representation and Classification of Targets. -- 9.2. Bayes Decision Rule. -- 9.3. The Neyman-Pearson Decision Rule. -- 9.4. Bayes Error Bounds. -- 9.5. Estimation of Parameters from Data. -- 9.6. Nonparametric Classification. -- B. CLASSIFICATION BY MATRIX DECOMPOSITION. -- 9.7. Coherent Decomposition. -- 9.8. Decomposition of Power-Type Matrices. -- C. REMOVAL OF UNPOLARIZED SCATTERING. -- 9.9. Decomposition of the D Matrix. -- 9.10. Polarized Clutter. -- 9.11. A Similar Decomposition. -- 9.12. Polarimetric Similarity Classification. -- References. -- Problems. -- APPENDIX A. FADING AND SPECKLE. -- Reference. -- APPENDIX B. PROBABILITY AND RANDOM PROCESSES. -- B.1. Probability. -- B.2. Random Variables. -- B.3. Random Vectors. -- B.4. Probability Density Functions in Remote Sensing. -- B.5. Random Processes. -- References. -- APPENDIX C. THE KENNAUGH MATRIX. -- APPENDIX D. BAYES ERROR BOUNDS. -- References. -- INDEX.

understanding polarized wave transmission, scattering, and reception in communication systems and polarimetric and non-polarimetric radar. Readers gain new insight into the methods for remotely gathering data about the earth's surface and atmosphere with polarimetric synthetic-aperture radar and polarimetric interferometry, including the changes that take place with seasons, floods, earthquakes, and other natural phenomena. In particular, with the book's focus on polarimetric radars, readers discover how to exploit the many special features of these systems, which provide the maximum amount of information that can be obtained remotely with radar. Introductory-level coverage of electromagnetic wave propagation, antennas, radar and synthetic aperture radar, probability and random processes, and radar interferometry serves as a foundation for advancing to more complex material. A more advanced mathematical and technical treatment enables readers to fully grasp polarized wave transmission, propagation, and reception in communication systems and polarimetric-radar remote sensing. Readers will discover much new material in this text, including: . Distinguishing between coherently-measured and incoherently-measured target matrices for power, recognizing that the two matrix types are not equivalent in representing targets. Removing unpolarized components from the scattered wave and deriving a target matrix for classification from the resulting coherently-scattered wave. Selecting an antenna polarization to maximize the contrast between desired and undesired depolarizing targets Problems ranging in complexity from introductory to challenging are presented throughout the text. Engineers will find this an ideal reference to help them fully utilize the powerful capabilities of polarimetric radar. It will also help agronomists, geographers, meteorologists, and other scientists who use remotely obtained data about the earth to evaluate procedures and better interpret the data. The book can also be tailored to both undergraduate and graduate courses in remote sensing, and recommendations are given for text material suitable for such courses.
