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Multiple-Snapshot, Double-Line Point-Regression F-Tests; 2.8 Experimental Data Description for a Low-Angle Tracking Radar Study; 2.9 Angle-of-Arrival (AOA) Estimation; 2.10 Diffuse Multipath Spectrum Estimation; 2.11 Discussion; References; 3. Time-Frequency Analysis of Sea Clutter; 3.1 Introduction; 3.2 An Overview of Nonstationary Behavior and Time-Frequency Analysis; 3.3 Theoretical Background on Nonstationarity; 3.3.1 Multi-taper Estimates; 3.3.2 Spectrum Estimation as an Inverse Problem
3.4 High-Resolution Multi-taper Spectrograms3.4.1 Nonstationary Quadratic-Inverse Theory; 3.4.2 Multi-taper Estimates of the Loeve Spectrum; 3.5 Spectrum Analysis of Radar Signals; 3.6 Discussion; 3.6.1 Target Detection Rooted in Learning; References; Part II Dynamic Models; 4. Dynamics of Sea Clutter; 4.1 Introduction; 4.2 Statistical Nature of Sea Clutter: Classical Approach; 4.2.1 Background; 4.2.2 Current Models; 4.3 Is There a Radar Clutter Attractor?; 4.3.1 Nonlinear Dynamics; 4.3.2 Chaotic Invariants; 4.3.3 Inconclusive Experimental Results on the Chaotic Invariants of Sea Clutter
4.3.4 Dynamic Reconstruction4.3.5 Chaos, a Self-Fulfilling Prophecy?; 4.4 Hybrid AM/FM Model of Sea Clutter; 4.4.1 Radar Return Plots; 4.4.2 Rayleigh Fading; 4.4.3 Time-Doppler Spectra; 4.4.4 Evidence for Amplitude Modulation, Frequency Modulation, and More; 4.4.5 Modeling Sea Clutter as a Nonstationary Complex Autoregressive Process; 4.5 Discussion; 4.5.1 Nonlinear Dynamics of Sea Clutter; 4.5.2 Autoregressive Modeling of Sea Clutter; 4.5.3 State-Space Theory; 4.5.4 Nonlinear Dynamical Approach Versus Classical Statistical Approach; 4.5.5 Stochastic Chaos; References
Appendix A Specifications of the Three Sea-Clutter Sets Used in This Chapter

Sommario/riassunto

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.