

Contents :

Front Matter

- Preface
- Preface to the Second Edition
- Notation

Chapter I. Introduction to a Transient World

- 1.1 Fourier Kingdom
- 1.2 Time-Frequency Wedding
- 1.3 Bases of Time-Frequency Atoms
- 1.4 Bases for What?
- 1.5 Travel Guide

Chapter II. Fourier Kingdom

- 2.1 Linear Time-Invariant Filtering
- 2.2 Fourier Integrals
- 2.3 Properties
- 2.4 Two-Dimensional Fourier Transform
- 2.5 Problems

Chapter III. Discrete Revolution

- 3.1 Sampling Analog Signals
- 3.2 Discrete Time-Invariant Filters
- 3.3 Finite Signals
- 3.4 Discrete Image Processing
- 3.5 Problems

Chapter IV. Time Meets Frequency

- 4.1 Time-Frequency Atoms
- 4.2 Windowed Fourier Transform
- 4.3 Wavelet Transforms
- 4.4 Time-Frequency Energy Distributions
- 4.5 Problems

Chapter V. Frames

- Frame Theory
- Redundant Signal Representations

- Gabor Frames
- Frame Algorithms
- Problems

Chapter VI. Wavelet Zoom

- Multiresolution Approximations
- Scaling Functions
- Wavelet Construction
- Fast Algorithms
- Problems

Chapter VII. Wavelet Bases

- Orthogonal Wavelet Bases
- Filter Banks
- Regularity and Vanishing Moments
- Biorthogonal Wavelets
- Wavelet Packets
- Problems

Chapter VIII. Wavelet Packet and Local Cosine Bases

- Wavelet Packet Bases
- Best Basis Selection
- Local Cosine Bases
- Time-Frequency Dictionaries
- Problems

Chapter IX. An Approximation Tour

- Linear Approximation
- Nonlinear Approximation
- Sparse Signal Expansions
- Approximation Error Analysis
- Problems

Chapter X. Estimations Are Approximations

- Signal Estimation
- Noise Removal
- Thresholding
- Statistical Estimation
- Wavelet Denoising
- Problems

Chapter XI. Transform Coding

- Quantization

- Entropy Coding
- Signal Compression
- Image Compression
- Video Compression
- Coding Algorithms
- Problems

Appendices

Appendix A. Mathematical Complements

- Linear Algebra
- Functional Analysis
- Probability Theory
- Harmonic Analysis

Appendix B. Software Toolboxes

- WaveLab Software
- Numerical Implementations
- Computational Examples

Back Matter

- Bibliography
- Index