

1. Record Nr.	UNINA9910877018903321
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Titolo	Digital signal processing techniques and applications in radar image processing // Bu-Chin Wang
Pubbl/distr/stampa	Hoboken, N.J., : John Wiley, c2008
ISBN	1-281-76670-4 9786611766702 0-470-37776-3 0-470-37782-8
Descrizione fisica	1 online resource (368 p.)
Collana	Wiley series on information and communications technologies
Disciplina	621.36/78
Soggetti	Signal processing - Digital techniques Remote sensing
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references (p. 333) and index.
Nota di contenuto	DIGITAL SIGNAL PROCESSING TECHNIQUES AND APPLICATIONS IN RADAR IMAGE PROCESSING; CONTENTS; Preface; Acknowledgment; List of Symbols; List of Illustrations; 1 Signal Theory and Analysis; 1.1 Special Functions Used in Signal Processing; 1.1.1 Delta or Impulse Function (t); 1.1.2 Sampling or Interpolation Function sinc (t); 1.2 Linear System and Convolution; 1.2.1 Key Properties of Convolution; 1.2.1.1 Commutative; 1.2.1.2 Associative; 1.2.1.3 Distributive; 1.2.1.4 Timeshift; 1.3 Fourier Series Representation of Periodic Signals; 1.3.1 Trigonometric Fourier Series 1.3.2 Compact Trigonometric Fourier Series 1.3.3 Exponential Fourier Series; 1.4 Nonperiodic Signal Representation by Fourier Transform; 1.5 Fourier Transform of a Periodic Signal; 1.6 Sampling Theory and Interpolation; 1.7 Advanced Sampling Techniques; 1.7.1 Sampling with Bandpass Signal; 1.7.2 Resampling by Evenly Spaced Decimation; 1.7.3 Resampling by Evenly Spaced Interpolation; 1.7.4 Resampling by Fractional Rate Interpolation; 1.7.5 Resampling from Unevenly Spaced Data; 1.7.5.1 Jacobian of Transformation; 2 Discrete Time and Frequency Transformation 2.1 Continuous and Discrete Fourier Transform 2.2 Key Properties of

Discrete Fourier Transform; 2.2.1 Shifting and Symmetry; 2.2.2 Linear and Circular Convolution; 2.2.3 Sectioned Convolution; 2.2.3.1 Overlap-and-Add Method; 2.2.3.2 Overlap-and-Save Method; 2.2.4 Zero Stuffing and Discrete Fourier Transform (DFT) Resolution; 2.3 Widows and Discrete Fourier Transform; 2.4 Fast Fourier Transform; 2.4.1 Radix-2 Fast Fourier Transform (FFT) Algorithms; 2.5 Discrete Cosine Transform (DCT); 2.5.1 Two-Dimensional DCT; 2.6 Continuous and Discrete Signals in Time and Frequency Domains 2.6.1 Graphical Representation of DFT 2.6.2 Resampling with Fractional Interpolation Based on DFT; 3 Basics of Antenna Theory; 3.1 Maxwell and Wave Equations; 3.1.1 Harmonic Time Dependence; 3.2 Radiation from an Infinitesimal Current Dipole; 3.2.1 Magnetic Vector Potential Due to a Small but Finite Current Element; 3.2.2 Field Vectors Due to Small but Finite Current Radiation; 3.2.3 Far-Field Region; 3.2.4 Summary of Radiation Fields; 3.3 Radiation from a Half-Wavelength Dipole; 3.4 Radiation from a Linear Array; 3.4.1 Power Radiation Pattern from a Linear Array 3.5 Power Radiation Pattern from a 2D Rectangular Array 3.6 Fundamentals of Antenna Parameters; 3.6.1 Radiation Beamwidth; 3.6.2 Solid Angle, Power Density, and Radiation Intensity; 3.6.3 Directivity and Gain; 3.6.4 Antenna Impedance; 3.6.5 Antenna Efficiency; 3.6.6 Effective Area and Antenna Gain; 3.6.7 Polarization; 3.7 Commonly Used Antenna Geometries; 3.7.1 Single-Element Radiators; 3.7.2 Microstrip Antennas and Antenna Array; 4 Fundamentals of Radar; 4.1 Principles of Radar Operation; 4.2 Basic Configuration of Radar; 4.2.1 Waveform Generator; 4.2.2 Transmitter; 4.2.3 Antenna System 4.2.4 Receiver

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### Sommario/riassunto

A self-contained approach to DSP techniques and applications in radar imaging. The processing of radar images, in general, consists of three major fields: Digital Signal Processing (DSP); antenna and radar operation; and algorithms used to process the radar images. This book brings together material from these different areas to allow readers to gain a thorough understanding of how radar images are processed. The book is divided into three main parts and covers: \* DSP principles and signal characteristics in both analog and digital domains, advanced signal sampling, and

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