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	Nota di contenuto	Digital Filters Design for Signal and Image Processing; Table of Contents; Introduction; Chapter 1. Introduction to Signals and Systems; 1.1. Introduction; 1.2. Signals: categories, representations and characterizations; 1.2.1. Definition of continuous-time and discrete-time signals; 1.2.2. Deterministic and random signals; 1.2.3. Periodic signals; 1.2.4. Mean, energy and power; 1.2.5. Autocorrelation function; 1.3. Systems; 1.4. Properties of discrete-time systems; 1.4.1. Invariant linear systems; 1.4.2. Impulse responses and convolution products; 1.4.3. Causality 1.4.4. Interconnections of discrete-time systems1.5. Bibliography; Chapter 2. Discrete System Analysis; 2.1. Introduction; 2.2. The z-transform; 2.2.1. Representations and summaries; 2.2.2. Properties of the z-transform; 2.2.2.1. Linearity; 2.2.2.2. Advanced and delayed operators; 2.2.2.3. Convolution; 2.2.2.4. Changing the z-scale; 2.2.2.5. Contrasted signal development; 2.2.2.6. Derivation of the z-transform; 2.2.2.7. The sum theorem; 2.2.2.8. The final-value theorem; 2.2.2.9.

Complex conjugation; 2.2.2.10. Parseval's theorem; 2.2.3. Table of standard transform; 2.3. The inverse z-transform
2.3.1. Introduction2.3.2. Methods of determining inverse z-transforms; 2.3.2.1. Cauchy's theorem: a case of complex variables; 2.3.2.2. Development in rational fractions; 2.3.2.3. Development by algebraic division of polynomials; 2.4. Transfer functions and difference equations; 2.4.1. The transfer function of a continuous system; 2.4.2. Transfer functions of discrete systems; 2.5. Z-transforms of the autocorrelation and intercorrelation functions; 2.6. Stability; 2.6.1. Bounded input, bounded output (BIBO) stability; 2.6.2. Regions of convergence; 2.6.2.1. Routh's criterion
2.6.2.2. Jury's criterionChapter 3. Frequential Characterization of Signals and Filters; 3.1. Introduction; 3.2. The Fourier transform of continuous signals; 3.2.1. Summary of the Fourier series decomposition of continuous signals; 3.2.1.1. Decomposition of finite energy signals using an orthonormal base; 3.2.1.2. Fourier series development of periodic signals; 3.2.2. Fourier transforms and continuous signals; 3.2.2.1. Representations; 3.2.2.2. Properties; 3.2.2.3. The duality theorem; 3.2.2.4. The quick method of calculating the Fourier transform; 3.2.2.5. The Wiener-Khintchine theorem
3.2.2.6. The Fourier transform of a Dirac comb3.2.2.7. Another method of calculating the Fourier series development of a periodic signal; 3.2.2.8. The Fourier series development and the Fourier transform; 3.2.2.9. Applying the Fourier transform: Shannon's sampling theorem; 3.3. The discrete Fourier transform (DFT); 3.3.1. Expressing the Fourier transform of a discrete sequence; 3.3.2. Relations between the Laplace and Fourier z-transforms; 3.3.3. The inverse Fourier transform; 3.3.4. The discrete Fourier transform; 3.4. The fast Fourier transform (FFT)
3.5. The fast Fourier transform for a time/frequency/energy representation of a non-stationary signal

Sommario/riassunto	Dealing with digital filtering methods for 1-D and 2-D signals, this book provides the theoretical background in signal processing, covering topics such as the z-transform, Shannon sampling theorem and fast Fourier transform. An entire chapter is devoted to the design of time-continuous filters which provides a useful preliminary step for analog-to-digital filter conversion.Attention is also given to the main methods of designing finite impulse response (FIR) and infinite impulse response (IIR) filters. Bi-dimensional digital filtering (image filtering) is investigated and a study on stabi