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Nota di contenuto	Complex and Hypercomplex Analytic Signals: Theory and Applications; Preface; Contents; 1 Introduction and Historical Background; 1.1 Introduction; 1.1.1 The Signal Domain Method; 1.1.2 The Frequency Domain Method; 1.2 A Historical Survey; References; 2 Survey of Chosen Hypercomplex Algebras; 2.1 Cayley-Dickson Algebras; 2.1.1 The Cayley-Dickson Construction; 2.1.2 The Cayley-Dickson algebra of quaternions; 2.1.3 The Cayley-Dickson Algebra of Octonions; 2.2 Selected Clifford Algebras; 2.2.1 The Clifford Algebra of Biquaternions; 2.2.2 The Clifford Algebra of Bioctonions. 2.3 Comparison of Algebras2.4 Applications of Hypercomplex Algebras in Signal Processing; 2.5 Summary; References; 3 Orthants of the n- Dimensional Cartesian Space and Single-Orthant Operators; 3.1 The Notion of an Orthant; 3.2 Single-Orthant Operators; 3.3 Decomposition of Real Functions into Even and Odd Terms; References; 4 Fourier Transformation in Analysis of n-Dimensional Signals; 4.1 Complex n-D Fourier Transformation; 4.1.1 Spectrum of a 1-D Real Signal in Terms of its Even and Odd Components; 4.1.2 Spectrum of a 2-D Real Signal in Terms of its Even and Odd Components. 4.1.3 Spectrum of a 3-D Real Signal in Terms of its Even and Odd Components4.2 Cayley-Dickson Fourier Transformation; 4.2.1 General Formulas; 4.2.2 Quaternion Fourier Spectrum in Terms of its Even and Odd Components; 4.2.3 Octonion Fourier Spectrum in Terms of its Even

and Odd Components; 4.3 Relations Between Complex and Hypercomplex Fourier Transforms; 4.3.1 Relation Between QFT and 2D FT; 4.3.2 Relation Between OFT and 3D FT; 4.4 Survey of Applications of Complex and Hypercomplex Fourier Transformations; 4.4.1 Applications in the Domain of Analytic Signals; 4.5 Summary; References.

5 Complex and Hypercomplex Analytic Signals 5.1 1-D Analytic Signals as Boundary Distributions of 1-D Analytic Functions; 5.2 The nD Analytic Signal; 5.2.1 The 2-D Complex Analytic Signals; 5.2.2 3-D Complex Analytic Signals; 5.3 Hypercomplex n-D Analytic Signals; 5.3.1 2-D Quaternion Signals; 5.3.2 3-D Hypercomplex Analytic Signals; 5.4 Monogenic 2-D Signals; 5.5 A Short Survey of the Notions of Analytic Signals with Single Orthant Spectra; 5.6 Survey of Application of nD Analytic Signals; 5.6.1 Applications Presented in Other Chapters of this Book.

5.6.2 Applications Described in Hahn's Book on Hilbert Transforms [7]

5.6.3 Selected Applications; References; 6 Ranking of Analytic Signals;

6.1 Definition of a Suborthant; 6.1.1 Subquadrants in 2-D; 6.1.2

Suboctants in 3-D; 6.2 Ranking of Complex Analytic Signals; 6.2.1

Ranking of 2-D Complex Analytic Signals; 6.2.2 Ranking of 3-D

Complex Analytic Signals; 6.3 Ranking of Hypercomplex Analytic

Signals; 6.3.1 Ranking of 2-D Cayley-Dickson Analytic Signals; 6.3.2

Ranking of 3-D Cayley-Dickson Analytic Signals; 6.4 Summary;

References; 7 Polar Representation of Analytic Signals; 7.1 Introduction.

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## Sommario/riassunto

Based on the bestselling Artech House classic title, Hilbert Transforms Signal Processing, this comprehensive new resource introduces complex and hypercomplex analytic signals and their applications. Professionals find in-depth explanations of the theory of multidimensional complex and hypercomplex signals illustrated with numerous examples and followed by practical applications. The survey of chosen hypercomplex algebras and the orthants of the n-dimensional Cartesian space and single-orthant operators are explored. This book also covers topics including, the polar representation of analytic signals, quasi-analytic signals, the space-frequency of n-D complex and hypercomplex signals as well as the causality of signals.

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