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Nota di contenuto	<p>Preface -- Acknowledgments -- Acronyms -- 1 Signals and Their Mathematical Models -- 1.1 Systems -- 1.2 Signals -- 1.3 Mathematical Models of Signals -- References -- 2 Fourier Analysis -- 2.1 Representations of Groups -- 2.1.1 Complete Reducibility -- 2.2 Fourier Transform on Finite Groups -- 2.3 Properties of the Fourier Transform -- 2.4 Matrix Interpretation of the Fourier Transform on Finite Non-Abelian Groups -- 2.5 Fast Fourier Transform on Finite Non-Abelian Groups -- References -- 3 Matrix Interpretation of the FFT -- 3.1 Matrix Interpretation of FFT on Finite Non-Abelian Groups -- 3.2 Illustrative Examples -- 3.3 Complexity of the FFT -- 3.3.1 Complexity of Calculations of the FFT -- 3.3.2 Remarks on Programming Implementation of FFT -- 3.4 FFT Through Decision Diagrams -- 3.4.1 Decision Diagrams -- 3.4.2 FFT on Finite Non-Abelian Groups Through DDs -- 3.4.3 MMTDs for the Fourier Spectrum -- 3.4.4 Complexity of DDs Calculation Methods -- References -- 4 Optimization of Decision Diagrams -- 4.1 Reduction Possibilities in Decision Diagrams -- 4.2 Group-Theoretic Interpretation of DD -- 4.3 Fourier Decision Diagrams -- 4.3.1 Fourier Decision Trees -- 4.3.2 Fourier Decision Diagrams -- 4.4 Discussion of Different Decompositions -- 4.4.1 Algorithm for Optimization of DDs -- 4.5 Representation of Two-Variable Function Generator -- 4.6 Representation of Adders by Fourier DD -- 4.7 Representation of Multipliers by Fourier DD -- 4.8 Complexity of NADD -- 4.9 Fourier DDs with Preprocessing -- 4.9.1 Matrix-valued Functions -- 4.9.2 Fourier Transform for Matrix-Valued Functions -- 4.10 Fourier Decision Trees with Preprocessing -- 4.11 Fourier Decision Diagrams with Preprocessing -- 4.12 Construction of FNAPDD -- 4.13 Algorithm for Construction of FNAPDD -- 4.13.1 Algorithm for Representation -- 4.14 Optimization of FNAPDD -- References -- 5 Functional Expressions on Quaternion Groups -- 5.1 Fourier Expressions on Finite Dyadic Groups -- 5.1.1 Finite Dyadic Groups -- 5.2 Fourier Expressions on Q_2. -- 5.3 Arithmetic Expressions -- 5.4 Arithmetic Expressions from Walsh Expansions -- 5.5 Arithmetic Expressions on Q_2 -- 5.5.1 Arithmetic Expressions and Arithmetic-Haar Expressions -- 5.5.2 Arithmetic-Haar Expressions and Kronecker Expressions -- 5.6 Different Polarity Polynomials Expressions -- 5.6.1 Fixed-Polarity Fourier Expressions in $C(Q_2)$ -- 5.6.2 Fixed-Polarity Arithmetic-Haar Expressions -- 5.7 Calculation of the Arithmetic-Haar Coefficients -- 5.7.1 FFT-like Algorithm -- 5.7.2 Calculation of Arithmetic-Haar Coefficients Through Decision Diagrams -- References -- 6 Gibbs Derivatives on Finite Groups -- 6.1 Definition and Properties of Gibbs Derivatives on Finite Non-Abelian Groups -- 6.2 Gibbs Anti-Derivative -- 6.3 Partial Gibbs Derivatives -- 6.4 Gibbs Differential Equations -- 6.5 Matrix Interpretation of Gibbs Derivatives -- 6.6 Fast Algorithms for Calculation of Gibbs Derivatives on Finite Groups -- 6.6.1 Complexity of Calculation of Gibbs Derivatives -- 6.7 Calculation of Gibbs Derivatives Through DDs -- 6.7.1 Calculation of Partial Gibbs Derivatives. -- References -- 7 Linear Systems on Finite Non-Abelian Groups -- 7.1 Linear Shift-Invariant Systems on Groups -- 7.2 Linear Shift-Invariant Systems on Finite Non-Abelian Groups --</p>

7.3 Gibbs Derivatives and Linear Systems -- 7.3.1 Discussion --
References -- 8 Hilbert Transform on Finite Groups -- 8.1 Some
Results of Fourier Analysis on Finite Non-Abelian Groups -- 8.2 Hilbert
Transform on Finite Non-Abelian Groups -- 8.3 Hilbert Transform in
Finite Fields -- References -- Index.

Sommario/riassunto

Discover applications of Fourier analysis on finite non-Abelian groups
The majority of publications in spectral techniques consider Fourier
transform on Abelian groups. However, non-Abelian groups provide
notable advantages in efficient implementations of spectral methods.
Fourier Analysis on Finite Groups with Applications in Signal Processing
and System Design examines aspects of Fourier analysis on finite non-
Abelian groups and discusses different methods used to determine
compact representations for discrete functions providing for their
efficient realizations and related applications. Switching functions are
included as an example of discrete functions in engineering practice.
Additionally, consideration is given to the polynomial expressions and
decision diagrams defined in terms of Fourier transform on finite non-
Abelian groups. A solid foundation of this complex topic is provided by
beginning with a review of signals and their mathematical models and
Fourier analysis. Next, the book examines recent achievements and
discoveries in: . Matrix interpretation of the fast Fourier transform.
Optimization of decision diagrams. Functional expressions on
quaternion groups. Gibbs derivatives on finite groups. Linear systems
on finite non-Abelian groups. Hilbert transform on finite groups
Among the highlights is an in-depth coverage of applications of
abstract harmonic analysis on finite non-Abelian groups in compact
representations of discrete functions and related tasks in signal
processing and system design, including logic design. All chapters are
self-contained, each with a list of references to facilitate the
development of specialized courses or self-study. With nearly 100
illustrative figures and fifty tables, this is an excellent textbook for
graduate-level students and researchers in signal processing, logic
design, and system theory-as well as the more general topics of
computer science and applied mathematics.
