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Book Reviews

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MODERN SAMPLING THEORY.
Edited by J. J. Benedetto and P. J. S. G. Ferreira.
Mathematics and Applications.
Birkhäuser, Boston-Basel-Berlin 2001, 417 p.
ISBN 0-8176-4023-1

The book concerns a fundamental impact of mathematics in engineering subjects such as speech, image and music processing, information transmission, biomedical engineering and others. It belongs to Birkhäuser's book series ANHA — Applied and Numerical Harmonic Analysis.

Sampling is a fundamental topic in the engineering, physical, medical and also in musical sciences. The new edited book focuses on recent mathematical methods and theoretical developments, as well as some current central applications of the classical sampling theorem. The classical sampling theorem originated in the nineteenth century. It is often associated with the names of Shannon, Kotelnikov, and Whittaker. An important part of this book is an English translation of the pioneering work published in the 1930s by V. A. Kotelnikov, a Russian engineer.

The book consists of Contents, Preface of editors, List of contributors. Then there follows Introduction by John J. Benedetto and Paolo J. S. G. Ferreira as **Chapter 1** containing a mathematical history and perspective on sampling theory, as well as an outline of the book and an overview of each chapter.

As **Chapter 2** of the volume there is presented the paper On the Transmission Capacity of the "Ether" and Wire in Electrocommunications by V A. Kotelnikov translated by V. E. Katsnelson.

The remainder of the book is divided into three parts.

Part I: Sampling, Wavelets, and the Uncertainty Principle

It contains

Chapter 3: Wavelets and Sampling, by Gilbert G. Walter.

Chapter 4: Embeddings and Uncertainty for Generalized Modulation Spaces, by J. A. Hogan and J. D. Lakey.

Chapter 5: Sampling Theory for Certain Hilbert Spaces of Bandlimited Functions, by Jean-Pierre Gabardo.

Chapter 6: Shannon-Type Wavelets and the Convergence of their Associated Wavelet Series, by Ahmed I. Zayed.

Part II: Sampling Topics from Mathematical Analysis

It consists of

Chapter 7: Non-Uniform Sampling in Higher Dimensions: From Trigonometric Polynomials to Bandlimited Functions, by Karlheinz Groechenig,

Chapter 8: The Analysis of Oscillatory Behavior in Signal Through Their Samples, by Rodolfo H. Torres,

Chapter 9: Residue and Sampling Techniques in Deconvolution, by Stephen Casey and David Walnut,

Chapter 10: Sampling Theorem from the Iteration of Low Order Differential Operators, by J. H. Higgins.

Chapter 11: Approximation of Continuous Functions by Rogosinski-Type Sampling Series, by Andi Kivinukk.

Part III: Sampling Tools and Applications

It contains

Chapter 12: Fast Fourier Transforms for Nonequispaced Data: A tutorial, by Daniel Potts, Gabriele Steidl, and Manfred Tasche,

Chapter 13: Efficient Minimum Rate Sampling of Signals with Frequency over Non-Commensurable Sets, by Cormac Herley and Ping Wah Wong,

Chapter 14: Finite- and Infinite-Dimensional Models for Oversampled Filter Banks, by Thomas Strohmer,

Chapter 15: Statistical Aspects of Sampling for Noisy and Grouped Data, by M. Pawlak and U. Stadtmueller,

Chapter 16: Reconstructing of MRI Images from Non-Uniform Sampling and its Application to Intrascan Motion Correction in Functional MRI, by Marc Bourgeous, Frank T. A. W. Wajer, Dirk van Ormondt, and Danielle Graveron-Demilly,

Chapter 17: Efficient Sampling of the Rotation Invariant Radon Transform, by Laurent Desbat and Catherine Mennessier.

The book closes with many references and Index.

The topic of this book will be a useful modern guide to sampling theory for engineers and mathematicians working in wavelets, signal processing, and harmonic analysis as well as scientists and engineers working on applications as medical imaging (MRI), music processing and transmission and so on.

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