Tatra Mt. Math. Publ. **23** (2001), 171–172

TATRA MOUNTAINS
Mathematical Publications

BOOK REVIEW

Benedetto, J. J. and Ferreira, P. J. S. G., (eds.): MODERN SAMPLING THEORY. Mathematics and Applications. Birkhäuser, Boston-Basel-Berlin 2001, 417 pp., ISBN 0–8176–4023–1.

This book belongs to Birkhäuser's book series ANHA–Applied and Numerical Harmonic Analysis. It concerns with a fundamental impact of mathematics in engineering subjects such as speech, image and music processing, information transmission, biomedical engineering and others. 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. One of the features 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 concerning outline of the book.

The important feature of the book is On the Transmission Capacity of the "Ether" and Wire in Electrocommunications by V. A. Kotelnikov translated by V. E. Katsnelson.

Chapter I. Sampling, Wavelets, and the Uncertainty Principle contains sections

Wavelets and Sampling by Gilbert G. Walter,

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

Sampling Theory for Certain Hilbert Spaces of Bandlimited Functions, by Jean-Pierre Gabardo,

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

Chapter II. Sampling Topics from Mathematical Analysis consists of sections

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

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

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

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

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

Chapter III. Sampling Tools and Applications contains sections

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

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

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

Statistical Aspects of Sampling for Noisy and Grouped Data, by M. Pawlak and U. Stadtmüller,

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,

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.

Miloslav Duchoň, Bratislava