Higher Order Spectra Analysis A Non Linear Signal Processing Framework 1st Edition By Nikias Chrysostomos Petropulu Athina P 1993 Hardcover

The theory of time series models has been well developed over the last thirt,y years. Both the frequenc.y domain and time domain approaches have been widely used in the analysis of linear time series models. However. many physical phenomena cannot be adequately represented by linear models; hence the necessity of nonlinear models and higher order spectra. Recently a number of nonlinear models have been proposed. In this monograph we restrict attention to one particular nonlinear model. known as the "bilinear model". The most interesting feature of such a model is that its second order covariance analysis is ve~ similar to that for a linear model. This demonstrates the importance of higher order covariance analysis for nonlinear models. For bilinear models it is also possible to obtain analytic expressions for covariances. spectra. etc. which are often difficult to obtain for other proposed nonlinear models. Estimation of bispectrum and its use in the construction of tests for linearit,y and symmetry are also discussed. All the methods are illustrated with simulated and real data. The first author would like to acknowledge the benefit he received in the preparation of this monograph from delivering a series of lectures on the topic of bilinear models at the University of Bielefeld. Ecole Normale Superieure. University of Paris (South) and the Mathematisch Cen trum. Ams terdam.

This manual will be valuable to practicing engineers who need an introduction to polyspectra from a signal processing perspective. In response to the recent growth of interest in polyspectra, this timely text provides an introduction to signal processing methods that are based on polyspectra and cumulants concepts. The emphasis of the book is placed on the presentation of signal processing tools for use in situations where the more common power spectrum estimation techniques fall short.

Very Good,No Highlights or Markup,all pages are intact.

The second volume will deal with a presentation of the main matrix and tensor decompositions and their properties of uniqueness, as well as very useful tensor networks for the analysis of massive data. Parametric estimation algorithms will be presented for the identification of the main tensor decompositions. After a brief historical review of the compressed sampling methods, an overview of the main methods of retrieving matrices and tensors with missing data will be performed under the low rank hypothesis. Illustrative examples will be provided.

Higher-order Spectra AnalysisA Nonlinear Signal Processing FrameworkPrentice Hall

????:???,??,???

This volume is the first part of the two-volume proceedings of the International C-ference on Artificial Neural Networks (ICANN 2005), held on September 11–15, 2005 in

Warsaw, Poland, with several accompanying workshops held on September 15, 2005 at the Nicolaus Copernicus University, Toru , Poland. The ICANN conference is an annual meeting organized by the European Neural Network Society in cooperation with the International Neural Network Society, the Japanese Neural Network Society, and the IEEE Computational Intelligence Society. It is the premier European event covering all topics concerned with neural networks and related areas. The ICANN series of conferences was initiated in 1991 and soon became the major European gathering for experts in those fields. In 2005 the ICANN conference was organized by the Systems Research Institute, Polish Academy of Sciences, Warsaw, Poland, and the Nicolaus Copernicus Univ- sity, Toru , Poland. From over 600 papers submitted to the regular sessions and some 10 special c- ference sessions, the International Program Committee selected – after a thorough peer-review process – about 270 papers for publication. The large number of papers accepted is certainly a proof of the vitality and attractiveness of the field of artificial neural networks, but it also shows a strong interest in the ICANN conferences.

A natural evolution of statistical signal processing, in connection with the progressive increase in computational power, has been exploiting higher-order information. Thus, high-order spectral analysis and nonlinear adaptive filtering have received the attention of many researchers. One of the most successful techniques for non-linear processing of data with complex non-Gaussian distributions is the independent component analysis mixture modelling (ICAMM). This thesis defines a novel formalism for pattern recognition and classification based on ICAMM, which unifies a certain number of pattern recognition tasks allowing generalization. The versatile and powerful framework developed in this work can deal with data obtained from quite different areas, such as image processing, impact-echo testing, cultural heritage, hypnograms analysis, web-mining and might therefore be employed to solve many different real-world problems.

This book has a dual purpose. One of these is to present material which selec tively will be appropriate for a quarter or semester course in time series analysis and which will cover both the finite parameter and spectral approach. The second object is the presentation of topics of current research interest and some open questions. I mention these now. In particular, there is a discussion in Chapter III of the types of limit theorems that will imply asymptotic nor mality for covariance estimates and smoothings of the periodogram. This dis cussion allows one to get results on the asymptotic distribution of finite para meter estimates that are broader than those usually given in the literature in Chapter IV. A derivation of the asymptotic distribution for spectral (second order) estimates is given under an assumption of strong mixing in Chapter V. A discussion of higher order cumulant spectra and their large sample properties under appropriate moment conditions follows in Chapter VI. Probability density, conditional probability density and regression estimates are considered in Chapter VII under conditions of short range dependence. Chapter VIII deals with a number of topics. At first estimates for the structure function of a large class of non-Gaussian linear processes are constructed. One can determine much more about this structure or transfer function in the non-Gaussian case than one can for Gaussian processes. In particular, one can determine almost all the phase information.

were published in the series as the contributed volume, Process Control Performance Assessment: From Theory to Implementation with Andrzej Ordys, Damian Uduehi, and

Michael Johnson as Editors (ISBN 978-1-84628-623-0, 2007). Along with this good progress in process controller assessment methods, researchers have also been investigating techniques to diagnose what is causing the process or control loop degradation. This requires the use of on-line data to identify faults via new diagnostic indicators of typical process problems. A significant focus of some of this research has been the issue of valve problems; a research direction that has been motivated by some industrial statistics that show up to 40% of control loops having performance degradation attributable to valve problems. Shoukat Choudhury, Sirish Shah, and Nina Thornhill have been very active in this research field for a number of years and have written a coherent and consistent presentation of their many research results as this monograph, Diagnosis of Process Nonlinearities and Valve Stiction. The Advances in Industrial Control series is pleased to welcome this new and substantial contribution to the process diagnostic literature. The reader will find the exploitation of the extensive process data archives created by today's process computer systems one theme in the monograph. From another viewpoint, the use of higher-order statistics could be considered to provide a continuing link to the earlier methods of the statistical process control paradigm.

"This book is a comprehensive and in-depth reference to the most recent developments in the field covering theoretical developments, techniques, technologies, among others"--Provided by publisher.

This report discusses the detection performance of a variety of higher order spectra for a variety of signals. Of particular significance is the introduction of a new type of higher order spectra called nonstationary higher order spectra. Nonstationary higher order spectra are not the stationary higher order spectral representations of nonstationary process, but are in fact different spectra which contain the stationary higher order spectra as a subset of their domain. It is shown quantitatively through theoretical predictions and simulations that these type of spectra perform better at detecting nonstationary signals than do the traditional stationary spectra. For the first time, small sample statistics have been derived and applied to the detection performance rather than asymptotic statistics, resulting in a more accurate performance prediction for typical sample sizes for nonstationary signals.

In this dissertation, we investigate the theory and application of higher-order spectral analysis techniques to condition monitoring in shipboard electrical power systems. Monitoring and early detection of faults in rotating machines, such as induction motors, are essential for both preventive maintenance and to avoid potentially severe damage. As machines degrade, they often tend to become more nonlinear. This increased nonlinearity results in the introduction of new frequencies which satisfy particular frequency selection rules; the exact selection rule depends on the order of the nonlinearity. In addition, the phases of the newly generated frequencies satisfy a similar phase selection rule. This results in a phase coherence, or phase coupling, between the "original" interacting frequencies and the "new" frequencies. This phase coupling is a true signature of nonlinearity. Since the classical auto-power spectrum contains no phase information, the phase coupling signature associated with nonlinear interactions is not available. However, various higher-order spectra (HOS) are capable of

detecting such nonlinear-induced phase coupling. The efficacy of the various proposed HOS-based methodologies is investigated using real-world vibration time-series data from a faulted induction motor driving a dc generator. The fault is controlled by varying a resistor placed in one phase of the three-phase line to the induction motor. First, we propose a novel method using a bispectral change detection (BCD) for condition monitoring. Even though the bicoherence is dominant and powerful in the detection of phase coupling of nonlinearly interacting frequencies, it has some difficulties in its application to machine condition monitoring. Basically, the bicoherence may not be able to distinguish between intrinsic nonlinearities associated with healthy machines and fault-induced nonlinearities. Therefore, the ability to discriminate the fault-only nonlinearities from the intrinsic nonlinearities is very important. The proposed BCD method can suppress the intrinsic nonlinearities of a healthy machine by nulling them out and thereby identify the fault-only nonlinearities. In addition, most machines contain rotating components, and the vibration fields they generate are periodic. These periodic impulse train signals may produce artificially high bicoherence values and can lead to ambiguous indications of faults in machine condition monitoring. The proposed BCD method can remove the artificially high bicoherence values caused by periodic impulse-train signals. With these advantages, the proposed BCD method is a new and sensitive indicator for condition monitoring. Second, we propose a novel method to estimate, from a measured single time-series data record, complex coupling coefficients in order to quantify the "strength" of nonlinear frequency interactions associated with rotating machine degradation. The estimation of the coupling coefficients is based on key concepts from higher-order spectral analysis and least mean-square-error analysis. The estimated coupling coefficients embody the physics of the nonlinear interactions associated with machine degradation and provide a quantitative measure of the "strength" of the nonlinear interactions. In addition, as an auto-quantity method utilizing a single time-series data record, the proposed method adds supplemental fault signature information to conventional tools. Such knowledge has the potential to advance the state-of-the-art of machine condition monitoring. Third, we propose a bispectral power transfer analysis methodology to quantify power transfer between nonlinearly interacting frequency modes associated with machine degradation. Our proposed method enables us to identify the relative amounts of power transferred by various nonlinear interactions, and thereby identify the predominant interactions. Such knowledge provides important new signature, or feature, information for machine condition monitoring diagnostics.

Nuclear magnetic resonance spectroscopy, which has evolved only within the last 20 years, has become one of the very important tools in chemistry and physics. The literature on its theory and application has grown immensely and a comprehensive and adequate treatment of all branches by one author, or even by several, becomes increasingly difficult. This series is planned to present

articles written by experts working in various fields of nuclear magnetic resonance spectroscopy, and will contain review articles as well as progress reports and original work. Its main aim, however, is to fill a gap, existing in literature, by publishing articles written by specialists, which take the reader from the introductory stage to the latest development in the field. The editors are grateful to the authors for the time and effort spent in writing the articles, and for their invaluable cooperation. The Editors Analysis of NMR Spectra A Guide for Chemists R. A. HOFFMAN t S. FORSEN Division of Physical Chemistry, Chemical Center, Lund Institute of Technology, Lund, Sweden B. GESTBLOM Institute of Physics, University of Uppsala, Sweden Contents I. Principles of NMR Spectroscopy 4 1. 1. The Magnetic Resonance Phenomenon 4 a) Nuclear Moments. . . . . 4 b) Magnetic Spin States and Energy Levels 5 c) The Magnetic Resonance Condition. 7 d) The Larmor Precession. . 7 e) Experimental Aspects . . . . 8 1. 2. Chemical Shifts . . . . . 9 a) The Screening Constant 11. . . 9 b) Chemical Shift Scales (11 and r) 10 1. 3. Spin Coupling Constants 12 1. 4. Intensities. . . . . .

In this book, leading researchers present their current work in the challenging area of chaos control in nonlinear circuits and systems, with emphasis on practical methodologies, system design techniques and applications. A combination of overview, tutorial and technical articles, the book describes state-of-the-art research on significant problems in this area. The scope and aim of this book are to bridge the gap between chaos control methods and circuits and systems. It is an ideal starting point for anyone who needs a fundamental understanding of controlling chaos in nonlinear circuits and systems.

Higher-Order Statistical Signal Processing brings together some most recent innovations in the field of higher-order statistical signal processing. It is structured to provide a comprehensive understanding of the fundamentals of the discipline, as well as a treatment of recent advances.

The object of the present work is a systematic statistical analysis of bilinear processes in the frequency domain. The first two chapters are devoted to the basic theory of nonlinear functions of stationary Gaussian processes, Hermite polynomials, cumulants and higher order spectra, multiple Wiener-Itô integrals and finally chaotic Wiener-Itô spectral representation of subordinated processes. There are two chapters for general nonlinear time series problems.

This book presents high-quality research on the concepts and developments in the field of information and communication technologies, and their applications. It features 134 rigorously selected papers (including 10 poster papers) from the Future of Information and Communication Conference 2020 (FICC 2020), held in San Francisco, USA, from March 5 to 6, 2020, addressing state-of-the-art intelligent methods and techniques for solving real-world problems along with a vision of future research Discussing various aspects of communication, data science, ambient intelligence, networking, computing, security and Internet of Things, the book offers researchers, scientists, industrial engineers and students

valuable insights into the current research and next generation information science and communication technologies.

Issues in Biomedical Engineering Research and Application: 2011 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Biomedical Engineering Research and Application. The editors have built Issues in Biomedical Engineering Research and Application: 2011 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Biomedical Engineering Research and Application in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Biomedical Engineering Research and Application: 2011 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/.

Presents the account of the use of mechanical ventilation in critically ill patients. This title features coverage that addresses important scientific, clinical, and technical aspects of the field as well as chapters that encompass the full scope of mechanical ventilation, including the physical basis of mechanical ventilation.

Higher-order spectral analysis of acoustical waveforms can provide phase information that is not retained in calculations of power spectral density. In the propagation of high intensity sound, nonlinearity can cause substantial changes in the waveform as frequency components interact with one another. The bispectrum, which is one order higher than power spectral density, may provide a useful measure of nonlinearity in propagation by highlighting spectral regions of interaction. This thesis provides a review of the bispectrum, places it in the context of nonlinear acoustic propagation, and presents spectra calculated as a function of distance for numerically propagated acoustic waveforms. The calculated spectra include power spectral density, quad-spectral density, bispectrum, spatial derivative of the bispectrum, bicoherence, and skewness function.

In the signal-processing research community, a great deal of progress in higher-order statistics (HOS) began in the mid-1980s. These last fifteen years have witnessed a large number of theoretical developments as well as real applications. Blind Estimation Using Higher-Order Statistics focuses on the blind estimation area and records some of the major developments in this field. Blind Estimation Using Higher-Order Statistics is a welcome addition to the few books on the subject of HOS and is the first major publication devoted to covering blind estimation using HOS. The book provides the reader with an introduction to HOS and goes on to illustrate its use in blind signal equalisation (which has many applications including (mobile) communications), blind system identification, and blind sources separation (a generic problem in signal processing with many applications including radar, sonar and communications). There is also a chapter devoted to robust cumulant estimation, an important problem where HOS results have been encouraging. Blind Estimation Using Higher-Order Statistics is an invaluable reference for researchers, professionals and graduate students working in signal processing and related areas.

About 123 attendees from the United States, France, United Kingdom, Italy, Japan, and Israel participated in the Workshop on Higher-Order Spectral Analysis. Held in Vail, Colorado, the three day event turned out to be very successful in terms of participation and quality of contributions. The objective of the workshop was to provide a forum for discussion of new theories and methods for processing signals that are based on Higher-Order Spectra. The overwhelming response to its announcement, as well as the breadth and depth of contributions and informal discussions among participants, clearly established that higher-order spectra is a new and emerging technology in signal processing and is expanding rapidly. The workshop featured two tutorial sessions, two keynote addresses, one panel discussion and ten technical sessions. Total of fifty papers were presented. There were no parallel sessions at the workshop. The technical program was truly outstanding. In addition, the workshop provided a very relaxing atmosphere where many informal discussions took place. This final report describes the events, and subject matter. Keywords: Symposia. (kt).

The state-of-the-art in NMR spectral analysis. This interactive tutorial provides readers with a comprehensive range of software tools and techniques, as well as the necessary theoretical knowledge required to analyze their spectra and obtain the correct NMR parameters. Modern Spectral Analysis provides expert guidance, by presenting efficient strategies to extract NMR parameters from measured spectra. A database of selected spectra and modern, powerful WIN-NMR software designed by Bruker are provided on the enclosed CD-ROM. The programs provided are 1 D WIN-NMR, WIN-DAISY, WIN-DR and WIN-DYNAMICS, and direct data exchange between all these programs is possible. Readers are shown how they can obtain maximum structural information from their 1 D NMR spectra with time-saving computer assistance. Practical problems that can occur and their solutions are discussed at length using clear, easy-to-follow examples. Both homo- and heteronuclear and first- and second-order spin systems are demonstrated. Moreover, relaxation analysis, nuclear Overhauser effects and magnetic site exchange are all covered in this hands-on guide to NMR spectral analysis.

Currently, the acquisition of seismic surveys is performed as a sequential operation in which shots are computed separately, one after the other. This approach is similar to that of multiple-access technology, which is widely used in cellular communications to allow several subscribers to share the same telephone line. The cost of performing various shots simultaneously is almost identical to that of one shot; thus, the savings in time and money expected from using the multishooting approach for computing seismic surveys compared to the current approach are enormous. By using this approach, the long-standing problem of simulating a three-dimensional seismic survey can be reduced to a matter of weeks and not years, as is currently the case. Investigates how to collect, stimulate, and process multishooting data Addresses the improvements in seismic characterization and resolution one can expect from multishooting data Aims to educate the oil and gas exploration and production business of the benefits of multishooting data, and to influence their day-to-day surveying techniques

Keeping pace with the expanding, ever more complex applications of DSP, this authoritative presentation of computational algorithms for statistical signal

processing focuses on advanced topics ignored by other books on the subject. Algorithms for Convolution and DFT. Linear Prediction and Optimum Linear Filters. Least-Squares Methods for System Modeling and Filter Design. Adaptive Filters. Recursive Least-Squares Algorithms for Array Signal Processing. QRD-Based Fast Adaptive Filter Algorithms. Power Spectrum Estimation. Signal Analysis with Higher-Order Spectra. For Electrical Engineers, Computer Engineers, Computer Scientists, and Applied Mathematicians.

This text covering the 1997 IEEE Signal Processing Workshop on High-Order Statistics is designed for researchers, professors, practitioners, students and other computing professionals.

The report describes the application of higher-order spectra to linear systems where a non-Gaussian input is measured without noise contamination, so that use of higher-order spectral analysis is not necessary to obtain an expression for the transfer function, which is simply the ratio of the cross spectrum between the input and the output to the spectrum of the input. However, because the input is non-Gaussian it is meaningful to consider use of higher-order spectra in connection with study of the system. We shall obtain relationships among various higher-order cross spectra. Mixed spectra will also be applied to the problem.

Copyright: 58f6de3524f48bb2645df6927ff42664