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Advanced Control of Chemical Processes 1994 D. Bonvin 2014-05-23 This publication brings together the latest research findings in the key area of chemical process control; including dynamic modelling and simulation - modelling and model validation for application in linear and nonlinear model-based control: nonlinear model-based predictive control and optimization - to facilitate constrained real-time optimization of chemical processes; statistical control techniques - major developments in the statistical interpretation of measured data to guide future research; knowledge-based v model-based control - the integration of theoretical aspects of control and optimization theory with more recent developments in artificial intelligence and computer science.
Digital Time Series Analysis Robert K.. Otnes 1972 Preliminary concepts -- Preprocessing of data -- Recursive digital filtering -- Fourier series and Fourier transform computations -- General considerations in computing power spectral density -- Correlation function and Blackman-Tukey spectrum computations -- Power and cross spectra from fast Fourier transforms -- Filter methods for the power spectral density -- Transfer function and coherence function computations -- Probability density function computations -- Miscellaneous techniques -- Test case and examples.
Parametric Time-Frequency Domain Spatial Audio Ville Pulkki 2017-12-26 A comprehensive guide that addresses the theory and practice of spatial audio This book provides readers with the principles and best practices in spatial audio signal processing. It describes how sound fields and their perceptual attributes are captured and analyzed within the time-frequency domain, how essential representation parameters are coded, and how such signals are efficiently reproduced for practical applications. The book is split into four parts starting with an overview of the fundamentals. It then goes on to explain the reproduction of spatial sound before offering an examination of signal-dependent spatial filtering. The book finishes with coverage of both current and future applications and the direction that spatial audio research is heading in. Parametric Time-frequency Domain Spatial Audio focuses on applications in entertainment audio, including music, home cinema, and gaming—covering the capturing and reproduction of spatial sound as well as its generation, transduction, representation, transmission, and perception. This book will teach readers the tools needed for such processing, and provides an overview to existing research. It also shows recent up-to-date projects and commercial applications built on top of the systems. Provides an in-depth presentation of the principles, past developments, state-of-the-art methods, and future research directions of spatial audio technologies Includes contributions from leading researchers in the field Offers MATLAB codes with selected chapters An advanced book aimed at readers who are capable of digesting mathematical expressions about digital signal processing and sound field analysis, Parametric Time-frequency Domain Spatial Audio is best suited for researchers in academia and in the audio industry.
The Finite Difference Time Domain Method for Electromagnetics KarlS. Kunz 2018-05-04 The Finite-Difference Time-domain (FDTD) method allows you to compute electromagnetic interaction for complex problem geometries with ease. The simplicity of the approach coupled with its far-reaching usefulness, create the powerful, popular method presented in The Finite Difference Time Domain Method for Electromagnetics. This volume offers timeless applications and formulations you can use to treat virtually any material type and geometry. The Finite Difference Time Domain Method for Electromagnetics explores the mathematical foundations of FDTD, including stability, outer radiation boundary conditions, and different coordinate systems. It covers derivations of FDTD for use with PEC, metal, lossy dielectrics, gyrotropic materials, and anisotropic materials. A number of applications are completely worked out with numerous figures to illustrate the results. It also includes a printed FORTRAN 77 version of the code that implements the technique in three dimensions for lossy dielectric materials. There are many methods for analyzing electromagnetic interactions for problem geometries. With The Finite Difference Time Domain Method for Electromagnetics, you will learn the simplest, most useful of these methods, from the basics through to the practical applications.
Hopf Bifurcation Analysis Jorge L. Moiola 1996 This book is devoted to the frequency domain approach, for both regular and degenerate Hopf bifurcation analyses. Besides showing that the time and frequency domain approaches are in fact equivalent, the fact that many significant results and computational formulas obtained in the studies of regular and degenerate Hopf bifurcations from the time domain approach can be translated and reformulated into the corresponding frequency domain setting, and be reconfirmed and rediscovered by using the frequency domain methods, is also explained. The description of how the frequency domain approach can be used to obtain several types of standard bifurcation conditions for general nonlinear dynamical systems is given as well as is demonstrated a very rich pictorial gallery of local bifurcation diagrams for nonlinear systems under simultaneous variations of several system parameters. In conjunction with this graphical analysis of local bifurcation diagrams, the defining and nondegeneracy conditions for several degenerate Hopf bifurcations is presented. With a great deal of algebraic computation, some higher-order harmonic balance approximation formulas are derived, for analyzing the dynamical behavior in small neighborhoods of certain types of degenerate Hopf bifurcations that involve multiple limit cycles and multiple limit points of periodic solutions. In addition, applications in chemical, mechanical and electrical engineering as well as in biology are discussed. This book is designed and written in a style of research monographs rather than classroom textbooks, so that the most recent contributions to the field can be included with references.
Frequency Domain Versus Time Domain Methods in System Identification L. Ljung 1979
Modal Analysis and Testing Júlio M. Montalvão e Silva 2012-12-06 Proceedings of the NATO Advanced Study Institute, Sesimbra, Portugal, 3-15 May, 1998
Time-domain and Frequency-domain Design Techniques for Model-reference Adaptive Control Systems Donald Wayne Sutherlin 1971
Digital Filter Design and Realization Takao Hinamoto 2017-05-08 Analysis, design, and realization of digital filters have experienced major developments since the 1970s, and have now become an integral part of the theory and practice in the field of contemporary digital signal processing. Digital Filter Design and Realization is written to present an up-to-date and comprehensive account of the analysis, design, and realization of digital filters. It is intended to be used as a text for graduate students as well as a reference book for practitioners in the field. Prerequisites for this book include basic knowledge of calculus, linear algebra, signal analysis, and linear system theory. Technical topics discussed in the book include: Discrete-Time Systems and z-TransformationStability and Coefficient SensitivityState-Space ModelsFIR Digital Filter DesignFrequency-Domain Digital Filter DesignTime-Domain Digital Filter DesignInterpolated and Frequency-Response-Masking FIR Digital Filter DesignComposite Digital Filter DesignFinite Word Length EffectsCoefficient Sensitivity Analysis and MinimizationError Spectrum ShapingRoundoff Noise Analysis and MinimizationGeneralized Transposed Direct-Form IIBlock-State Realization
Identification of Continuous-Time Systems N.K. Sinha 1991-07-31 In view of the importance of system identification, the International Federation of Automatic Control (IFAC) and the International Federation of Operational Research Societies (IFORS) hold symposia on this topic every three years. Interest in continuous time approaches to system identification has been growing in recent years. This is evident from the fact that the of invited sessions on continuous time systems has increased from one in the 8th number Symposium that was held in Beijing in 1988 to three in the 9th Symposium in Budapest in 1991. It was during the 8th Symposium in August 1988 that the idea of bringing together important results on the topic of Identification of continuous time systems was conceived. Several distinguished colleagues, who were with us in Beijing at that time, encouraged us by promising on the spot to contribute to a comprehensive volume of collective work. Subsequently, we contacted colleagues all over the world, known for their work in this area, with a formal request to contribute to the proposed volume. The response was prompt and overwhelmingly encouraging. We sincerely thank all the authors for their valuable contributions covering various aspects of identification of continuous time systems.
Special Issue on Finite Difference Time and Frequency Domain Methods Thomas Weiland 1999
A Comparison of Time Domain and Frequency Domain Test Methods for Automotive Components H. L. Schwab 1994
Frequency-Domain Methods for Characterization of Pulsed Power Diagnostics 2009 This paper discusses methods of frequency-domain characterization of pulsed power sensors using vector network analyzer and spectrum analyzer techniques that offer significant simplification over time-domain methods, while mitigating or minimizing the effect of the difficulties present in time domain characterization. These methods are applicable to characterization of a wide variety of sensors.
Parametric Time-Frequency Domain Spatial Audio Ville Pulkki 2017-10-04 A comprehensive guide that addresses the theory and practice of spatial audio This book provides readers with the principles and best practices in spatial audio signal processing. It describes how sound fields and their perceptual attributes are captured and analyzed within the time-frequency domain, how essential representation parameters are coded, and how such signals are efficiently reproduced for practical applications. The book is split into four parts starting with an overview of the fundamentals. It then goes on to explain the reproduction of spatial sound before offering an examination of signal-dependent spatial filtering. The book finishes with coverage of both current and future applications and the direction that spatial audio research is heading in. Parametric Time-frequency Domain Spatial Audio focuses on applications in entertainment audio, including music, home cinema, and gaming—covering the capturing and reproduction of spatial sound as well as its generation, transduction, representation, transmission, and perception. This book will teach readers the tools needed for such processing, and provides an overview to existing research. It also shows recent up-to-date projects and commercial applications built on top of the systems. Provides an in-depth presentation of the principles, past developments, state-of-the-art methods, and future research directions of spatial audio technologies Includes contributions from leading researchers in the field Offers MATLAB codes with selected chapters An advanced book aimed at readers who are capable of digesting mathematical expressions about digital signal processing and sound field analysis, Parametric Time-frequency Domain Spatial Audio is best suited for researchers in academia and in the audio industry.
Frequency Domain Methods for the Stability Analysis of Nonlinear and Time-varying Feedback Systems Yo-Sung Cho 1968
Fundamentals of Clinical Data Science Pieter Kubben 2018-12-21 This open access book comprehensively covers the fundamentals of clinical data science, focusing on data collection, modelling and clinical applications. Topics covered in the first section on data collection include: data sources, data at scale (big data), data stewardship (FAIR data) and related privacy concerns. Aspects of predictive modelling using techniques such as classification, regression or clustering, and prediction model validation will be covered in the second section. The third section covers aspects of (mobile) clinical decision support systems, operational excellence and value-based healthcare. Fundamentals of Clinical Data Science is an essential resource for healthcare professionals and IT consultants intending to develop and refine their skills in personalized medicine, using solutions based on large datasets from electronic health records or telemonitoring programmes. The book's promise is "no math, no code"and will explain the topics in a style that is optimized for a healthcare audience.
Design of Observer-based Compensators Peter Hippe 2009-05-14 Design of Observer-based Compensators facilitates and adds transparency to design in the frequency domain which is not as well-established among control engineers as time domain design. The presentation of the design procedures starts with a review of the time domain results; therefore, the book also provides quick access to state space methods for control system design. Frequency domain design of observer-based compensators of all orders is covered. The design of decoupling and disturbance rejecting controllers is presented, and solutions are given to the linear quadratic and the model matching problems. The pole assignment design is facilitated by a new parametric approach in the frequency domain. Anti-windup control is also investigated in the framework of the polynomial approach. The discrete-time results for disturbance rejection and linear quadratic control are also presented. The book contains worked examples that can easily be reproduced by the reader, and the results are illustrated by simulations.
System Identification Rik Pintelon 2012-03-19 System identification is a general term used to describe mathematical tools and algorithms that build dynamical models from measured data. Used for prediction, control, physical interpretation, and the designing of any electrical systems, they are vital in the fields of electrical, mechanical, civil, and chemical engineering. Focusing mainly on frequency domain techniques, System Identification: A Frequency Domain Approach, Second Edition also studies in detail the similarities and differences with the classical time domain approach. It high??lights many of the important steps in the identification process, points out the possible pitfalls to the reader, and illustrates the powerful tools that are available. Readers of this Second Editon will benefit from: MATLAB software support for identifying multivariable systems that is freely available at the website http://booksupport.wiley.com State-of-the-art system identification methods for both time and frequency domain data New chapters on non-parametric and parametric transfer function modeling using (non-)period excitations Numerous examples and figures that facilitate the learning process A simple writing style that allows the reader to learn more about the theo??retical aspects of the proofs and algorithms Unlike other books in this field, System Identification, Second Edition is ideal for practicing engineers, scientists, researchers, and both master's and PhD students in electrical, mechanical, civil, and chemical engineering.
Signal Analysis Ronald L. Allen 2004-06-07 Offers a well-rounded, mathematical approach to problems in signal interpretation using the latest time, frequency, and mixed-domain methods Equally useful as a reference, an up-to-date review, a learning tool, and a resource for signal analysis techniques Provides a gradual introduction to the mathematics so that the less mathematically adept reader will not be overwhelmed with instant hard analysis Covers Hilbert spaces, complex analysis, distributions, random signals, analog Fourier transforms, and more
The Fragility of the Phillips Curve Feng Zhu 2005 We provide a robustness check of the US Phillips curve in the frequency domain. We design frequency-specific coeffcients of correlation (FSCC) and regression (FSCR), based on our frequency-specific data extraction procedure. Being real-valued, signed and normalised, the FSCC is superior to traditional indicators such as coherence and cospectrum. Our FSCC and FSCR estimates suggest that the Phillips tradeoffs vary greatly across frequencies, with frequent sign reversals. They seem to be stable in higher frequencies, but unstable in low and medium frequencies, and they are sensitive to the level and boundaries of frequency aggregation, to the way data are processed prior to analysis (eg detrending) and to the type of variables used. In this sense, the Phillips curves are fragile. The impact of potential cross-frequency model inconsistency on model estimation using conventional time domain methods needs careful scrutiny.
Vibration-based Techniques For Damage Detection And Localization In Engineering Structures Nobari Ali Salehzadeh 2018-05-04 In the oil and gas industries, large companies are endeavoring to find and utilize efficient structural health monitoring methods in order to reduce maintenance costs and time. Through an examination of the vibration-based techniques, this title addresses theoretical, computational and experimental methods used within this trend. By providing comprehensive and up-to-date coverage of established and emerging processes, this book enables the reader to draw their own conclusions about the field of vibration-controlled damage detection in comparison with other available techniques. The chapters offer a balance between laboratory and practical applications, in addition to detailed case studies, strengths and weakness are drawn from a broad spectrum of information. Contents: Machine Learning Algorithms for Damage Detection (Eloi Figueiredo and Adam Santos)Data-Driven Methods for Vibration-Based Monitoring Based on the Singular Spectrum Analysis (Irina Trendafilova, David Garcia and Hussein Al-Bugharbee)Experimental Investigation of Delamination Effects on

Modal Damping of a CFRP Laminate, Using a Statistical Rationalization Approach (Majid Khazaee, Ali Salehzadeh Nobari and M H Ferri Aliabadi)Problem of Detecting Damage Through Natural Frequency Changes (Gilbert-Rainer Gillich, Nuno N N Maia and Ion Cornel Mituletu)Damage Localization Based on Modal Response Measured with Shearography (J V Araújo dos Santos and H Lopes)Novel Techniques for Damage Detection Based on Mode Shape Analysis (Wieslaw Ostachowicz, Maciej Radzieński, Maosen Cao and Wei Xu)Damage Identification Based on Response Functions in Time and Frequency Domains (R P C Sampaio, T A N Silva, N M M Maia and S Zhong) Readership: Engineers, technicians, researchers working in the field of vibration-based techniques. Keywords: Structural Health Monitoring;SHM;Vibration-based SHM;Machine Learning;Time Domain Data Analysis;Frequency Domain Data Analysis;Damage IndexReview: Key Features: The 1st book to address theoretical, computational and experimental methodsThe book provides an up to date and comprehensive coverage of established and emerging techniques within the field of vibration-controlled damage detectionExcellent balance between laboratory and practical applicationsMany case studies in various chapters that help the reader to identify weak and strong points of various techniques

Frequency Domain Methods for the Analysis of Time Delay Systems Andreas Otto 2016

A Framework Interpreting Bender Element Tests, Combining Time-Domain and Frequency-Domain Methods António Viana da Fonseca 2009 Bender element (BE) testing is a powerful and increasingly common laboratory technique for determining the shear S-wave velocity of geomaterials. There are several advantages of BE testing, but there is no standard developed for the testing procedures or for the interpretation of the results. This leads to high degree of uncertainty and subjectivity in the interpretation. In this paper, the authors review the most common methods for the interpretation of BE tests, discuss some important technical requirements to minimize errors, and propose a practical framework for BE testing, based on the comparison of different interpretation techniques in order to obtain the most reliable value for the travel time. This new procedure consists of the application of a methodical, systematic, and objective approach for the interpretation of the results, in the time and frequency domains. The use of an automated tool enables unbiased information to be obtained regarding variations in the results to assist in the decision of the travel time. Two natural soils were tested: residual soil from Porto granite, and Toyoura sand. Specimens were subjected to the same isotropic stress conditions and the results obtained provided insights on the effects of soil type and confining stress on the interpretation of BE results; namely, the differences in testing dry versus saturated soils, and in testing uniform versus well-graded soils.

Experimental System Identification of Model Frames Using Frequency-domain and Time-domain Methods Andrew W. Smyth 1994 Two different metal test frames are excited using the impact-hammer method. The force-input and specific acceleration-output time-histories were recorded, and through frequency-domain, and time-domain structural system identification methods, the systems were identified. Artifacts of the test method and equipment, in the input-output data are highlighted, and their effect upon the identification is diminished through digital signal processing techniques. With some explainable differences, the correspondence between the systems identified in the frequency-domain, the systems identified in the time-domain, and analytical models of the test structures was quite good. Structural system identification, particularly through discrete time-domain methods (due to the digital nature of future implementations), enables the calibration of synthesized finite element models using prototype data, is an excellent means of non-destructive damage evaluation, and is required for active structural control.

Frequency Domain Analysis of Radar Data Using High Resolution Time Domain Techniques Michael John Gerry 1993

Time and Frequency: Theory and Fundamentals Byron Emerson Blair 1974

Handbook Of Machine Learning - Volume 1: Foundation Of Artif Tshilidzi Marwala 2018-12-22

A Comparison of Time and Frequency Domain Methods of Frequency Estimation David S. Akers 2001

Fourier Transforms in NMR, Optical, and Mass Spectrometry A.G. Marshall 2016-02-25 Written by spectroscopists for spectroscopists, here is a book which is not only a valuable handbook and reference work, but also an ideal teaching text for Fourier transform methods as they are applied in spectroscopy. It offers the first unified treatment of the three most popular types of FT/spectroscopy, with uniform notation and complete indexing of specialized terms. All mathematics is self-contained, and requires only a knowledge of simple calculus. The main emphasis is on pictures and physical analogs rather than detailed algebra. Instructive problems, presented at the end of each chapter, offer extensions of the basic treatment. Solutions are given or outlined for all problems. The book offers a wealth of practical information to spectroscopists. Non-ideal effects are treated in detail: noise (source- and detector-limited); non-linear response; limits to spectrometer performance based on finite detection period, finite data size, mis-phasing, etc. Common puzzles and paradoxes are explained: e.g. use of mathematically complex variables to represent physically real quantities; interpretation of negative frequency signals; on-resonance vs. off-resonance response; interpolation (when it helps and when it doesn't); ultimate accuracy of the data; differences between linearly- and circularly-polarized radiation; multiplex advantage or disadvantage, etc. Chapter 1 introduces the fundamental line shapes encountered in spectroscopy, from a simple classical mass-on-a-spring model. The Fourier transform relationship between the time-domain response to a sudden impulse and the steady-state frequency-domain response (absorption and dispersion spectra) to a continuous oscillation is established and illustrated. Chapters 2 and 3 summarize the basic mathematics (definitions, formulas, theorems, and examples) for continuous (analog) and discrete (digital) Fourier transforms, and their practical implications. Experimental aspects which are common to the signal (Chapter 4) and noise (Chapter 5) in all forms of Fourier transform spectrometry are followed by separate chapters for treatment of those features which are unique to FT/MS, FT/optical, FT/NMR, and other types of FT/spectroscopy. The list of references includes both historical and comprehensive reviews and monographs, along with articles describing several key developments. The appendices provide instant access to FT integrals and fast algorithms as well as a pictorial library of common Fourier transform function pairs. The comprehensive index is designed to enable the reader to locate particular key words, including those with more than one name.

Time Domain and Frequency Domain Measurements Techniques H. W. Loes 1969

Analysis and Control of Nonlinear Systems with Stationary Sets Jinzhi Wang 2009 Nonlinear systems with stationary sets are important because they cover a lot of practical systems in engineering. Previous analysis has been based on the frequency-domain for this class of systems. However, few results on robustness analysis and controller design for these systems are easily available. This book presents the analysis as well as methods based on the global properties of systems with stationary sets in a unified time-domain and frequency-domain framework. The focus is on multi-input and multi-output systems, compared to previous publications which considered only single-input and single-output systems. The control methods presented in this book will be valuable for research on nonlinear systems with stationary sets.

Condition Monitoring with Vibration Signals Asoke K. Nandi 2019-12-23 Provides an extensive, up-to-date treatment of techniques used for machine condition monitoring Clear and concise throughout, this accessible book is the first to be wholly devoted to the field of condition monitoring for rotating machines using vibration signals. It covers various feature extraction, feature selection, and classification methods as well as their applications to machine vibration datasets. It also presents new methods including machine learning and compressive sampling, which help to improve safety, reliability, and performance. Condition Monitoring with Vibration Signals: Compressive Sampling and Learning Algorithms for Rotating Machines starts by introducing readers to Vibration Analysis Techniques and Machine Condition Monitoring (MCM). It then offers readers sections covering: Rotating Machine Condition Monitoring using Learning Algorithms; Classification Algorithms; and New Fault Diagnosis Frameworks designed for MCM. Readers will learn signal processing in the time-frequency domain, methods for linear subspace learning, and the basic principles of the learning method Artificial Neural Network (ANN). They will also discover recent trends of deep learning in the field of machine condition monitoring, new feature learning frameworks based on compressive sampling, subspace learning techniques for machine condition monitoring, and much more. Covers the fundamental as well as the state-of-the-art approaches to machine condition monitoringguiding readers from the basics of rotating machines to the generation of knowledge using vibration signals Provides new methods, including machine learning and compressive sampling, which offer significant improvements in accuracy with reduced computational costs Features learning algorithms that can be used for fault diagnosis and prognosis Includes previously and recently developed dimensionality reduction techniques and classification algorithms Condition Monitoring with Vibration Signals: Compressive Sampling and Learning Algorithms for Rotating Machines is an excellent book for research students, postgraduate students, industrial practitioners, and researchers.

Frequency-domain and Time-domain Methods for Analyses of Microstrip Structures in Anisotropic Media Cheung-Wei Lam 1989

Identification of Frequency Domain and Time Domain Aeroelastic Parameters for Flutter Analysis of Flexible Structures Arindam Gan Chowdhury 2004 Flutter analysis of structures is usually done in frequency domain. Alternately, time-domain methods have been suggested. For frequency-domain flutter analysis, flutter derivatives are used that can be identified from section model testing in the wind tunnel. In time-domain analysis, the frequency-dependent aerodynamic self-excited forces expressed in flutter derivatives acting on the structure can be approximated in the Laplace domain by Rational functions. The art of efficient extraction of these aeroelastic parameters requires an elastic suspension system to capture coupled displacement and aerodynamic force time histories from wind tunnel testing of section models. A novel three-degree-of-freedom (DOF) suspension system has been developed for the wind-tunnel section model study of wind-excited vibrations of flexible structures. The extraction of flutter derivatives becomes more challenging when the number of DOF of the section model increases from two to three. Since the work in the field of identifying all eighteen flutter derivatives has been limited, it has motivated the development of a new system identification method (Iterative least squares method or ILS method) to efficiently extract the flutter derivatives using a section model suspended by the three-DOF elastic suspension system. All eighteen flutter derivatives for a streamlined bridge deck and an airfoil section model were identified by using the ILS approach. Flutter derivatives related to the lateral DOF were emphasized. For time-domain flutter analysis, the Rational function approximation (RFA) approach involves approximation of the experimentally obtained flutter derivatives through the 'multilevel linear and nonlinear optimization' procedure. This motivated the formulation of a system identification technique (Experimental extraction of Rational function coefficients or E2RFC) to directly extract the Rational function coefficients from wind tunnel testing. The current formulation requires testing of the model at fewer numbers of velocities than in the flutter-derivative formulation leading to significant reduction in time and resources associated with extraction of flutter derivatives and eventual Rational function approximation. Successful numerical simulation using E2RFC formulation with two lag terms was performed, proving the robustness of the technique. Experimental extraction of Rational function coefficients associated with one lag term formulation was made for a streamlined bridge deck section model.

A Synthesis of Time and Frequency Domain Methods for the Control of Infinite-dimensional Systems: a System Theoretic Approach Ruth Frances Curtain 1989

Time Domain and Frequency Domain Measurement Techniques College of Aeronautics (Cranfield, England). Department of Electrical and Control Engineering 1969

Comparison of Frequency-domain and Time-domain Rotorcraft Vibration Control Methods 1984

A Comparison of Marine Time-domain and Frequency-domain Controlled Source Electromagnetic Methods Dylan Connell 2011 The frequency-domain marine controlled source electromagnetic (CSEM) method has recently become a tool in determining subsurface resistivity related to hydrocarbon formations in the deep water environment. In shallow water, this frequency-domain method is subject to airwave saturation that severely limits sensitivity to targets at depth. It has been suggested that time-domain CSEM may offer an improved resolution to these deep targets, as well as increased sensitivity to resistors in the presence of the airwave. In order to examine and test these claims, a modeling code has been developed for computing time-domain responses for layered 1D models with arbitrarily located and oriented transmitters and receivers. The code extends the open-source frequency domain code Dipole1D by efficiently computing the time-domain, step-on, and impulse responses by Fourier transformation of the frequency-domain kernels. Impulse responses are used along with pseudo-random binary sequences (PRBS) to generate synthetic time-domain data. A realistic noise model and waveform scaling effects are then applied to synthetic step-on, PRBS, and the frequency-domain SIO "Waveform D" data generated from this code. Wiener deconvolution is applied to recover impulse responses from the PRBS data, allowing for a systematic examination of the sensitivity and resolution of time-domain and frequency-domain CSEM to representative targets of interest for offshore hydrocarbon exploration. These studies suggest that there is no large ad- vantage to time-domain techniques, as previously suggested, and rather that the frequency-domain Waveform D should give better results in the presence of noise for the shallow marine setting.

Plane-Wave Theory of Time-Domain Fields Thorkild B. Hansen 1999-06-10 "This invaluable book provides a comprehensive framework for the formulation and solution ofnumerous problems involving the radiation, reception, propagation, and scattering of electromagnetic and acoustic waves. Filled with original derivations and theorems, it includes the first rigorous development of plane-wave expansions for time-domain electromagnetic and acoustic fields. For the past 35 years, near-field measurement techniques have been confined to the frequency domain. Now, with the publication of this book, probe-corrected near-field measurement techniques have been extended to ultra-wide-band, short-pulse transmitting and receiving antennas and transducers. By combining unencumbered straightforward derivations with in-depth expositions of prerequisite material, the authors have created an invaluable resource for research scientists and engineers in electromagnetics and acoustics, and a definitive reference on plane-wave expansions and near-field measurements. Featured topics include: * An introduction to the basic electromagnetic and acoustic field equations * A rigorous development of time-domain and frequency-domain plane-wave representations * The formulation of time-domain, frequency-domain, and static planar near-field measurement techniques with and without probe-correction * Sampling theorems and computation schemes for time-domain and frequency-domain fields * Analytic-signal formulas that simplify the formulation and analysis of transient fields * Wave phenomena, such as ``electromagnetic missiles"" encountered only in the time domain * Definitive force and power relations for electromagnetic and acoustic fields and sources." Sponsored by: IEEE Antennas and Propagation Society.

Laser-Based Measurements for Time and Frequency Domain Applications Pasquale Maddaloni 2016-04-19 Foreword by Nobel laureate Professor Theodor W. Hänsch of Ludwig-Maximilians-Universität München Based on the authors' experimental work over the last 25 years, Laser-Based Measurements for Time and Frequency Domain Applications: A Handbook presents basic concepts, state-of-the-art applications, and future trends in optical, atomic, and molecular physics. It provides all the background information on the main kinds of laser sources and techniques, offers a detailed account of the most recent results obtained for time- and frequency-domain applications of lasers, and develops the theoretical framework necessary for understanding the experimental applications. After a historical introduction, the book describes the basic concepts and mathematical tools required for studying the physics of oscillators. It then discusses microwave and optical resonators, crucial aspects of operation and fundamental properties of lasers, and precision spectroscopy and absolute frequency metrology. It also focuses on microwave and optical frequency standards and explores current and potential research directions. Accessible to scientists, postdoc researchers, and advanced undergraduate students, this self-contained book gives a wide-ranging, balanced overview of the areas—including frequency standards and clocks, ultra-high-precision spectroscopy, quantum information, and environmental metrology—revolutionized by the recent advent of optical frequency comb synthesizers (OFCSs) based on femtosecond mode-locked lasers. The book is also a useful guide to cutting-edge research for manufacturers of advanced laser systems and optical devices.