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Quantum Theory of Finite Systems Automorphisms of Fusion Systems of Finite Simple Groups of Lie Type Stability of Finite and Infinite Dimensional Systems Analysis and Control of Finite-Valued Systems Locally Finite Root Systems Mathematical Control Theory Analysis and Control of Finite-Value Systems Finite-Spectrum Assignment for Time-Delay Systems Mathematical Structure of Finite Random Cybernetic Systems Linear Systems Over Finite Fields Finite-Time Stability: An Input-Output Approach the application of algebraic systems to finite automata System Theory of Continuous Time Finite Dimensional Dynamical Systems Finite Dimensional Linear Systems Finite Element Systems Finite Precision Number Systems and Arithmetic The Connection between Infinite Dimensional and Finite Dimensional Dynamical Systems Verification and Control of Hybrid Systems Mathematical Structure of Finite Random Cybernetic Systems Finitary Measures for Subshifts of Finite Type and Sofic Systems Regular Canonical Systems and Finite Automata The Finite Systems Scheme Finite Precision Number Systems and Arithmetic Uncertainty Assessment of Large Finite Element Systems Dissipativity in Control Engineering Mathematics of Finite-dimensional Control Systems The Finite Element Method for Engineers Switched Finite Time Control of a Class of Underactuated Systems Finite-Time Stability: An Input-Output Approach Theory of Critical Phenomena in Finite-Size Systems Finite Element Methods Computational Structural Analysis and Finite Element Methods Finite Element Systems Physics and Chemistry of Finite Systems: From Clusters to Crystals Mathematical Systems Least-Squares Finite Element Methods Finite Time and Cooperative Control of Flight Vehicles Dynamics of Flexible Multibody Systems Engineering Finite Element Analysis Finite Size Scaling And Numerical Simulation Of Statistical Systems

Quantum Theory of Finite Systems

1986

this book provides a comprehensive and pedagogical account of the various methods used in the quantum theory of finite systems including molecular atomic nuclear and particle phenomena covering both background material and advanced topics and including nearly 200 problems quantum theory of finite systems has been designed to serve primarily as a text and will also prove useful as a reference in research the first of the book s four parts introduces the basic mathematical apparatus second quantization canonical transformations wick theorems and the resulting diagram expansions and oscillator models the second part presents mean field approximations and the recently developed path integral methods for the quantization of collective modes part three develops perturbation theory in terms of both time dependent feynman diagrams and time independent goldstone diagrams a fourth part discusses variational methods based on correlated wavefunctions including spin correlations the approximation schemes are formulated for fermions and bosons at eigher zero or non zero temperature although the formalism developed applies to both finite and infinite systems the book stresses those aspects of the theory that are specific to the description of finite systems thus special attention is given to mean field approximations the ensuing broken symmetries and the associated collective motions such as rotations conversely some specific features of systems with infinite numbers of degrees of freedom such as the thermodynamic limit critical phenomena and the elimination of ultraviolet divergencies are deliberately omitted jean paul blaizot and georges ripka are associated with the centre d etudes nucleaires de saclay

Automorphisms of Fusion Systems of Finite Simple Groups of Lie Type

2020-02-13

for a finite group g of lie type and a prime p the authors compare the automorphism groups of the fusion and linking systems of g at p with the automorphism group of g itself when p is the defining characteristic of g they are all isomorphic with a very short list of exceptions when p is different from the defining characteristic the situation is much more complex but can always be reduced to a case where the natural map from out g to outer automorphisms of the fusion or linking system is split surjective this work is motivated in part by questions involving extending the local structure of a group by a group of automorphisms and in part by wanting to describe self homotopy equivalences of bg p in terms of out g

Stability of Finite and Infinite Dimensional Systems

2012-12-06

the aim of stability of finite and infinite dimensional systems is to provide new tools for specialists in control system theory stability theory of ordinary and partial differential equations and differential delay equations stability of finite and infinite dimensional systems is the first book that gives a systematic exposition of the approach to stability analysis which is based on estimates for matrix valued and operator valued functions allowing us to investigate various classes of finite and infinite dimensional systems from the unified viewpoint this book contains solutions to the problems connected with the aizerman and generalized aizerman conjectures and presents fundamental results by a yu levin for the stability of nonautonomous systems having variable real characteristic roots stability of finite and infinite dimensional systems is intended not only for specialists in stability theory but for anyone interested in various applications who has had at least a first year graduate level course in analysis

Analysis and Control of Finite-Valued Systems

2018-05-11

a comprehensive work in finite value systems that covers the latest achievements using the semi tensor product method on various kinds of finite value systems these results occupy the highest position in the analysis and control of this field it not only covers all aspects of research in finite value systems but also presents the mathematical derivation for each conclusion in depth the book contains examples to provide a better understanding of the practical applications of finite value systems it will serve as a textbook for graduate students of cybernetics mathematical and biology and a reference for readers interested in the theory of finite value systems

Locally Finite Root Systems

2004

we develop the basic theory of root systems r in a real vector space x which are defined in analogy to the usual finite root systems except that finiteness is replaced by local finiteness the intersection of r with every finite dimensional subspace of x is finite the main topics are weyl groups parabolic subsets and positive systems weights and gradings

Mathematical Control Theory

2013-11-21

geared primarily to an audience consisting of mathematically advanced undergraduate or beginning graduate students this text may additionally be used by engineering students interested in a rigorous proof oriented systems course that goes beyond the classical frequency domain material and more applied courses the minimal mathematical background required is a working knowledge of linear algebra and differential equations the book covers what constitutes the common core of control theory and is unique in its emphasis on foundational aspects while covering a wide range of topics written in a standard theorem proof style it also develops the necessary techniques from scratch in this second edition new chapters and sections have been added dealing with time optimal control of linear systems variational and numerical approaches to nonlinear control nonlinear controllability via lie algebraic methods and controllability of recurrent nets and of linear systems with bounded controls

Analysis and Control of Finite-Value Systems

2018

a comprehensive work in finite value systems that covers the latest achievements using the semi tensor product method on various kinds of finite value systems these results occupy the highest position in the analysis and control of this field it not only covers all aspects of research in finite value systems but also presents the mathematical derivation for each conclusion in depth the book contains examples to provide a better understanding of the practical applications of finite value systems it will serve as a textbook for graduate students of cybernetics mathematical and biology and a reference for readers interested in the theory of finite value systems

Finite-Spectrum Assignment for Time-Delay Systems

1998-09-25

the presence of considerable time delays in many industrial processes is well recognized and achievable performances of conventional unity feedback control systems are degraded if a process has a relatively large time delay compared to its time constants in this case dead time compensation is necessary in order to enhance the performances the most popular scheme for such compensation is the smith predictor but it is unsuitable for unstable or lightly damped processes because the compensated closed loop system always contains the process poles themselves an alternative scheme for delay elimination from the closed loop is the finite spectrum assignment fsa strategy and it can arbitrarily assign the closed loop spectrum one may note that the smith predictor control can be found in delay systems control books and many process control books but the fsa control is rarely included in these books it is therefore timely and desirable to fill this gap by writing a book which gives a comprehensive treatment of the fsa approach this is useful and worthwhile since the fsa provides not only an alternative way but also certain advantages over the smith predictor the book presents the state of the art of the finite spectrum assignment for time delay systems in frequency domain it mainly contains those works carried out recently by the authors in this field most of them have been published and others are awaiting publication they are assembled together and reorganized in such a way that the presentation is logical smooth and systematic

Mathematical Structure of Finite Random Cybernetic Systems

2014-05-04

systematically presents the input output finite time stability io fts analysis of dynamical systems covering issues of analysis design and robustness the interest in finite time control has continuously grown in the last fifteen years this book systematically presents the input output finite time stability io fts analysis of dynamical systems with specific reference to linear time varying systems and hybrid systems it discusses analysis design and robustness issues and includes applications to real world engineering problems while classical fts has an important theoretical significance io fts is a more practical concept which is more suitable for real engineering applications the goal of the research on

this topic in the coming years key features includes applications to real world engineering problems input output finite time stability io fts is a practical concept useful to study the behavior of a dynamical system within a finite interval of time computationally tractable conditions are provided that render the technique applicable to time invariant as well as time varying and impulsive i e switching systems the lmis formulation allows mixing the io fts approach with existing control techniques e g h control optimal control pole placement etc this book is essential reading for university researchers as well as post graduate engineers practicing in the field of robust process control in research centers and industries topics dealt with in the book could also be taught at the level of advanced control courses for graduate students in the department of electrical and computer engineering mechanical engineering aeronautics and astronautics and applied mathematics

Linear Systems Over Finite Fields

2004

this book discusses the realization and control problems of finite dimensional dynamical systems which contain linear and nonlinear systems the author focuses on algebraic methods for the discussion of control problems of linear and non linear dynamical systems the book contains detailed examples to showcase the effectiveness of the presented method the target audience comprises primarily research experts in the field of control theory but the book may also be beneficial for graduate students alike

Finite-Time Stability: An Input-Output Approach

2018-07-19

originally published in 1970 finite dimensional linear systems is a classic textbook that provides a solid foundation for learning about dynamical systems and encourages students to develop a reliable intuition for problem solving the theory of linear systems has been the bedrock of control theory for 50 years and has served as the springboard for many significant developments all the while remaining impervious to change since linearity lies at the heart of much of the mathematical analysis used in applications a firm grounding in its central ideas is essential this book touches upon many of the standard topics in applied mathematics develops the theory of linear systems in a systematic way making as much use as possible of vector ideas and contains a number of nontrivial examples and many exercises

the application of algebraic systems to finite automata

1963

fundamental arithmetic operations support virtually all of the engineering scientific and financial computations required for practical applications from cryptography to financial planning to rocket science this comprehensive reference provides researchers with the thorough understanding of number representations that is a necessary foundation for designing efficient arithmetic algorithms using the elementary foundations of radix number systems as a basis for arithmetic the authors develop and compare alternative algorithms for the fundamental operations of addition multiplication division and square root with precisely defined roundings various finite precision number systems are investigated with the focus on comparative analysis of practically efficient algorithms for closed arithmetic operations over these systems each chapter begins with an introduction to its contents and ends with bibliographic notes and an extensive bibliography the book may also be used for graduate teaching problems and exercises are scattered throughout the text and a solutions manual is available for instructors

System Theory of Continuous Time Finite Dimensional Dynamical Systems

2020

the last few years have seen a number of major developments demonstrating that the long term behavior of solutions of a very large class of partial differential equations possesses a striking resemblance to the behavior of solutions of finite dimensional dynamical systems or ordinary differential equations the first of these advances was the discovery that a dissipative pde has a compact global attractor with finite hausdorff and fractal dimensions more recently it was shown that some of these pdes possess a finite dimensional inertial manifold that is an invariant manifold containing the attractor and exponentially attractive trajectories with the improved understanding of the exact connection between finite dimensional dynamical systems and various classes of dissipative pdes it is now realistic to hope that the wealth of studies of such topics as bifurcations of finite vector fields and strange fractal attractors can be brought to bear on various mathematical models including continuum flows surprisingly a number of distributed systems from continuum mechanics have been

found to exhibit the same nontrivial dynamic behavior as observed in low dimensional dynamical systems as a natural consequence of these observations a new direction of research has arisen detection and analysis of finite dimensional dynamical characteristics of infinite dimensional systems this book represents the proceedings of an ams ims siam summer research conference held in july 1987 at the university of colorado at boulder bringing together mathematicians and physicists the conference provided a forum for presentations on the latest developments in the field and fostered lively interactions on open questions and future directions with contributions from some of the top experts these proceedings will provide readers with an overview of this vital area of research

Finite Dimensional Linear Systems

2015-05-26

hybrid systems describe the interaction of software described by finite models such as finite state machines with the physical world described by infinite models such as differential equations this book addresses problems of verification and controller synthesis for hybrid systems although these problems are very difficult to solve for general hybrid systems several authors have identified classes of hybrid systems that admit symbolic or finite models the novelty of the book lies on the systematic presentation of these classes of hybrid systems along with the relationships between the hybrid systems and the corresponding symbolic models to show how the existence of symbolic models can be used for verification and controller synthesis the book also outlines several key results for the verification and controller design of finite systems several examples illustrate the different methods and techniques discussed in the book

Finite Element Systems

1982

is there a class of measures which is natural for sofic systems in the same way that markov measures are natural for subshifts of finite type motivated by this question we identify and study a class of finitary measures on sofic systems we aim to convince the reader that in addition to answering the above question those measures are related to markov measures in the way that sofic systems are related to subshifts of finite type

Finite Precision Number Systems and Arithmetic

2010-09-30

this comprehensive reference volume suitable for graduate teaching includes problems exercises solutions and an extensive bibliography

The Connection between Infinite Dimensional and Finite Dimensional Dynamical Systems

1989

the treatment of uncertainties in the analysis of engineering structures remains one of the premium challenges in modern structural mechanics it is only in recent years that the developments in stochastic and deterministic computational mechanics began to be synchronized to foster these developments novel computational procedures for the uncertainty assessment of large finite element systems are presented in this monograph the stochastic input is modeled by the so called karhunen loève expansion which is formulated in this context both for scalar and vector stochastic processes as well as for random fields particularly for strongly non linear structures and systems the direct monte carlo simulation technique has proven to be most advantageous as method of solution the capabilities of the developed procedures are demonstrated by showing some practical applications

Verification and Control of Hybrid Systems

2009-06-12

dissipativity as a natural mechanism of energy interchange is common to many physical systems that form the basis of modern automated control applications over the last decades it has turned out as a useful concept that can be generalized and applied in an abstracted form to very different system setups including ordinary and partial differential equation models in this monograph the basic notions of stability dissipativity and systems theory are connected in order to establish a common basis for designing system monitoring and control schemes the approach is illustrated with a set of application examples covering finite and infinite dimensional models including a ship steering model the inverted pendulum chemical and biological reactors relaxation oscillators unstable heat equations and first

order hyperbolic integro differential equations

Mathematical Structure of Finite Random Cybernetic Systems

2014-09-01

eine einführung in alle aspekte der finiten elemente jetzt schon in der 4 auflage geboten wird eine ausgewogene mischung theoretischer und anwendungsorientierter kapitel mit vielen beispielen schwerpunkte liegen auf anwendungen aus der mechanik dem wärmetransport der elastizität sowie auf disziplinübergreifenden problemen strömungen von fluiden elektromagnetismus eine nützliche und zuverlässige informationsquelle für studenten und praktiker

Finitary Measures for Subshifts of Finite Type and Sofic Systems

1985

the control of mechanical systems with constraints has been a topic of intense research in the control and dynamical systems community for the past two decades in particular systems with velocity and or acceleration level constraints which appear in many applications like robotics spacecrafts launch vehicles underwater vehicles have been studied intensively this monograph is a self contained exposition on a switched finite time control strategy for this class of systems beginning with basic definitions and mathematical preliminaries the monograph works its way up to the main control algorithm three well studied applications are chosen to demonstrate the algorithm other facets of the algorithm and an alternate algorithm are also briefly touched upon the monograph is intended for graduate students and researchers in the area of nonlinear control and dynamical systems

Regular Canonical Systems and Finite Automata

1959

systematically presents the input output finite time stability io fts analysis of dynamical systems covering issues of analysis design and robustness the interest in finite time control has continuously grown in the last fifteen years this book systematically presents the input output finite time stability io fts analysis of dynamical systems with specific reference to linear time varying systems and hybrid systems it discusses analysis design and robustness issues and includes applications to real world engineering problems while classical fts has an important theoretical significance io fts is a more practical concept which is more suitable for real engineering applications the goal of the research on this topic in the coming years key features includes applications to real world engineering problems input output finite time stability io fts is a practical concept useful to study the behavior of a dynamical system within a finite interval of time computationally tractable conditions are provided that render the technique applicable to time invariant as well as time varying and impulsive i e switching systems the lmis formulation allows mixing the io fts approach with existing control techniques e g h control optimal control pole placement etc this book is essential reading for university researchers as well as post graduate engineers practicing in the field of robust process control in research centers and industries topics dealt with in the book could also be taught at the level of advanced control courses for graduate students in the department of electrical and computer engineering mechanical engineering aeronautics and astronautics and applied mathematics

The Finite Systems Scheme

1993

the aim of this book is to familiarise the reader with the rich collection of ideas methods and results available in the theory of critical phenomena in systems with confined geometry the existence of universal features of the finite size effects arising due to highly correlated classical or quantum fluctuations is explained by the finite size scaling theory this theory 1 offers an interpretation of experimental results on finite size effects in real systems 2 gives the most reliable tool for extrapolation to the thermodynamic limit of data obtained by computer simulations 3 reveals the intimate mechanism of how the critical singularities build up in the thermodynamic limit and 4 can be fruitfully used to explain the low temperature behaviour of quantum critical systems the exposition is given in a self contained form which presumes the reader s knowledge only in the framework of standard courses on the theory of phase transitions and critical phenomena the instructive role of simple models both classical and quantum is demonstrated by putting the accent on the derivation of rigorous and exact analytical results contents overview of critical phenomena in bulk systemsthe approximating hamiltonian methodexactly solved modelsfinite size scaling at criticalitylong range interactionsmodified finite size scalingboundary effectsfinite size scaling at first order transitionslimit gibbs states and finite size scalingbulk quantum systemsthe casimir effectsurvey of results on the

casimir effect readership graduate students and researchers in theoretical and condensed matter physics keywords phase transition critical phenomena finite size scaling quantum phase transitionsreviews this book offers a careful survey of finite size scaling near bulk phase transitions journal of statistical physics the book is a very comprehensive and detailed account of this field i have found the final section on the casimir effect particularly interesting it is very well written and detailed i recommend it to serious students of critical phenomena and condensed matter but those who already have the basic knowledge of the theory of phase transitions contemporary physics

Finite Precision Number Systems and Arithmetic

2010-09-30

based on the proceedings of the first conference on superconvergence held recently at the university of jyvaskyla finland presents reviewed papers focusing on superconvergence phenomena in the finite element method surveys for the first time all known superconvergence techniques including their proofs

Uncertainty Assessment of Large Finite Element Systems

2005-06-08

graph theory gained initial prominence in science and engineering through its strong links with matrix algebra and computer science moreover the structure of the mathematics is well suited to that of engineering problems in analysis and design the methods of analysis in this book employ matrix algebra graph theory and meta heuristic algorithms which are ideally suited for modern computational mechanics efficient methods are presented that lead to highly sparse and banded structural matrices the main features of the book include application of graph theory for efficient analysis extension of the force method to finite element analysis application of meta heuristic algorithms to ordering and decomposition sparse matrix technology efficient use of symmetry and regularity in the force method and simultaneous analysis and design of structures

Dissipativity in Control Engineering

2021-07-19

recent innovations in experimental techniques such as molecular and cluster beam epitaxy supersonic jet expansion matrix isolation and chemical synthesis are increasingly enabling researchers to produce materials by design and with atomic dimension these materials constrained by sire shape and symmetry range from clusters containing as few as two atoms to nanoscale materials consisting of thousands of atoms they possess unique structurai electronic magnetic and optical properties that depend strongly on their size and geometry the availability of these materials raises many fundamental questions as weil as technological possibilities from the academic viewpoint the most pertinent question concerns the evolution of the atomic and electronic structure of the system as it grows from micro clusters to crystals at what stage for example does the cluster look as if it is a fragment of the corresponding crystal how do electrons forming bonds in micro clusters transform to bands in solids how do the size dependent properties change from discrete quantum conditions as in clusters to boundary constrained bulk conditions as in nanoscale materials to bulk conditions insensitive to boundaries how do the criteria of classification have to be changed as one goes from one size domain to another potential for high technological applications also seem to be endless clusters of otherwise non magnetic materials exhibit magnetic behavior when constrained by size shape and dimension nanoscaie metal particles exhibit non linear opticai properties and increased mechanical strength simiiarly materials made from nanoscale ceramic particies possess plastic behavior

Mathematics of Finite-dimensional Control Systems

1979

since their emergence finite element methods have taken a place as one of the most versatile and powerful methodologies for the approximate numerical solution of partial differential equations these methods are used in incompressible fluid flow heat transfer and other problems this book provides researchers and practitioners with a concise guide to the theory and practice of least square finite element methods their strengths and weaknesses established successes and open problems

The Finite Element Method for Engineers

2001-09-07

this book focuses on the finite time control of attitude stabilization attitude tracking for individual

spacecraft and finite time control of attitude synchronization it discusses formation reconfiguration for multiple spacecraft in complex networks and provides a new fast nonsingular terminal sliding mode surface fntsms further it presents newly designed controllers and several control laws to enhance the performance of spacecraft systems and meet related demands such as strong disturbance rejection and high precision control as such the book establishes a fundamental framework for these topics while also highlighting the importance of integrated analysis it is a useful resource for all researchers and students who are interested in this field as well as engineers whose work involves designing flight vehicles

Switched Finite Time Control of a Class of Underactuated Systems

2006-05-04

a new approach is presented in this book for modelling multi body systems which constitutes a substantial enhancement of the rigid finite element method the new approach is based on homogeneous transformations and joint coordinates apart from its simple physical interpretation and easy computer implementation the method is also valuable for educational purposes since it impressively illustrates the impact of mechanical features on the mathematical model

Finite-Time Stability: An Input-Output Approach

2018-10-08

finite element analysis is a basic foundational topic that all engineering majors need to understand in order for them to be productive engineering analysts for a variety of industries this book provides an introductory treatment of finite element analysis with an overview of the various fundamental concepts and applications it introduces the basic concepts of the finite element method and examples of analysis using systematic methodologies based on ansys software finite element concepts involving one dimensional problems are discussed in detail so the reader can thoroughly comprehend the concepts and progressively build upon those problems to aid in analyzing two dimensional and three dimensional problems moreover the analysis processes are listed step by step for easy implementation and an overview of two dimensional and three dimensional concepts and problems is also provided in addition multiphysics problems involving coupled analysis examples are presented to further illustrate the broad applicability of the finite element method for a variety of engineering disciplines the book is primarily targeted toward undergraduate students majoring in civil biomedical mechanical electrical and aerospace engineering and any other fields involving aspects of engineering analysis

Theory of Critical Phenomena in Finite-Size Systems

2000-08-21

the theory of finite size scaling describes a build up of the bulk properties when a small system is increased in size this description is particularly important in strongly correlated systems where critical fluctuations develop with increasing system size including phase transition points polymer conformations since numerical computer simulations are always done with finite samples they rely on the finite size scaling theory for data extrapolation and analysis with the advent of large scale computing in recent years the use of the size scaling methods has become increasingly important

Finite Element Methods

1998-01-05

Computational Structural Analysis and Finite Element Methods

2013-12-11

Finite Element Systems

1982

Physics and Chemistry of Finite Systems: From Clusters to Crystals

2013-11-11

Mathematical Systems

1969

Least-Squares Finite Element Methods

2009-04-28

Finite Time and Cooperative Control of Flight Vehicles

2018-07-02

Dynamics of Flexible Multibody Systems

2007-04-17

Engineering Finite Element Analysis

2017-05-02

Finite Size Scaling And Numerical Simulation Of Statistical Systems

1990-01-01

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