Analysis Of Complex Nonlinear Mechanical Systems A Computer Algebra Assisted Approach World Scientific Series On Nonlinear Science Series A

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Applied Dynamics - F. C. Moon 1998-06-15
Applied Dynamics provides a modern and thorough examination of dynamics with specific emphasis on physical examples and applications such as: robotic systems, magnetic bearings, aerospace dynamics, and microelectromagnetic machines. Also includes the development of the method of virtual velocities based on the principle of virtual power.
Sliding Mode Based Analysis and Identification of Vehicle Dynamics - Hocine Imine 2011-07-14
Vehicles are complex mechanical systems with strong nonlinear characteristics and which can present some uncertainties due to their dynamic parameters such as masses, inertias, suspension springs, tires side slip coefficients, etc. A vehicle is composed of many parts, namely the unsprung mass, the sprung mass, the suspension which makes the link between these two masses and therefore ensures passenger comfort, and also the pneumatic which absorbs the energy coming from the road and ensures contact between the vehicle and the road. In addition to its complexity and the presence of many nonlinearities and uncertainties, the presence of some external perturbations, such as the wind and the road inputs with its own characteristics (radius of curvature, longitudinal and lateral slop, road profile and skid resistance) can cause risks not only to the vehicle but also to passengers and other road users. Many methods have been developed in order to understand the behavior of a vehicle (light and heavy vehicle), control it and assist the driver in order to avoid possible lane departures, rollover or jackknifing risks, to ensure a better passenger comfort by means of a suspension control and/or to estimate a safety speed and trajectory.
Applications of Chaos and Nonlinear Dynamics in Science and Engineering - - Santo Banerjee 2016-10-13
Chaos and nonlinear dynamics initially developed as a new emergent field with its foundation in physics and applied mathematics. The highly

generic, interdisciplinary quality of the insights gained in the last few decades has spawned myriad applications in almost all branches of science and technology—and even well beyond. Wherever quantitative modeling and analysis of complex, nonlinear phenomena is required, chaos theory and its methods can play a key role. his fourth volume concentrates on reviewing further relevant contemporary applications of chaotic and nonlinear dynamics as they apply to the various cuttingedge branches of science and engineering. This encompasses, but is not limited to, topics such as synchronization in complex networks and chaotic circuits, time series analysis, ecological and biological patterns, stochastic control theory and vibrations in mechanical systems. Featuring contributions from active and leading research groups, this collection is ideal both as a reference and as a 'recipe book' full of tried and tested, successful engineering applications.

Nonlinear Control Systems Design 1992 - Michel Fliess 1993

Hardbound. This volume represents most aspects of the rich and growing field of nonlinear control. These proceedings contain 78 papers, including six plenary lectures, striking a balance between theory and applications. Subjects covered include feedback stabilization, nonlinear and adaptive control of electromechanical systems, nonholonomic systems. Generalized state space systems, algebraic computing in nonlinear systems theory, decoupling, linearization and model-matching and robust control are also covered.

Newtonian Nonlinear Dynamics for Complex Linear and Optimization Problems - Luis Vazquez de Frutos 2012-11-27

Newtonian Nonlinear Dynamics for Complex Linear and Optimization Problems explores how Newton's equation for the motion of one particle in classical mechanics combined with finite difference methods allows creation of a mechanical scenario to solve basic problems in linear algebra and programming. The authors present a novel, unified numerical and mechanical approach and an important analysis method of optimization.

Proceedings - 1999

Nonlinear Dynamics, Volume 1 - Gaëtan Kerschen 2015-08-14

Nonlinear Dynamics, Volume 1. Proceedings of the 33rd IMAC, A Conference and Exposition on Balancing Simulation and Testing, 2015, the first volume of ten from the Conference brings together contributions to this important area of research and engineering. The collection presents early findings and case studies on fundamental and applied aspects of Structural Dynamics, including papers on: Nonlinear Oscillations Nonlinear Simulation Using Harmonic Balance Nonlinear Modal Analysis Nonlinear System Identification Nonlinear Modeling & Simulation Nonlinearity in Practice Nonlinear Systems Round Robin on Nonlinear System Identification.

On the Dynamic Simulation of Large Nonlinear Mechanical Systems - Raymond Joseph Cipra 1978

Applied Mechanics Reviews - 1994

JSME International Journal - 2001

Recent Trends in Chaotic, Nonlinear and Complex Dynamics - Jan Awrejcewicz 2021-07-16

In recent years, enormous progress has been made on nonlinear dynamics particularly on chaos and complex phenomena. This unique volume presents the advances made in theory, analysis, numerical simulation and experimental realization, promising novel practical applications on various topics of current interest on chaos and related fields of nonlinear dynamics. Particularly, the focus is on the following topics: synchronization vs. chaotic phenomena, chaos and its control in engineering dynamical systems, fractal-based dynamics, uncertainty and unpredictability measures vs. chaos, Hamiltonian systems and systems with time delay, local/global stability, bifurcations and their control, applications of machine learning to chaos, nonlinear vibrations of lumped mass mechanical/mechatronic systems (rigid body and coupled oscillator dynamics) governed by ODEs and continuous structural members (beams, plates, shells) vibrations governed by PDEs, patterns formation,

chaos in micro- and nano-mechanical systems, chaotic reduced-order models, energy absorption/harvesting from chaotic, chaos vs. resonance phenomena, chaos exhibited by discontinuous systems, chaos in lab experiments. The present volume forms an invaluable source on recent trends in chaotic and complex dynamics for any researcher and newcomers to the field of nonlinear dynamics.

Analysis of Complex Nonlinear Mechanical Systems - Martin Lesser 1995

The book covers the fundamentals of the mechanics of multibody systems, i.e., systems of interconnected rigid bodies. A geometric view is emphasized in which the techniques and algorithms are motivated by the picture of the rigid body system as a point in the multidimensional space of all possible configurations. The reader is introduced to computer algebra methods in the form of a system, called Sophia, which is implemented in the Maple symbolic manipulation system. The first chapter provides a motivational introduction to the basic principles and an introduction to Maple. Kinematics based on the idea of tangent vectors to the configuration manifold sets the stage for dynamical analysis. The latter ranges from the Lagrange and Gibbs-Appell to Kane's equations. Coverage includes nonholonomic systems and redundant variable methods. The computer algebra methods included enable the treatment of nontrivial mechanical systems and the development of efficient numerical codes for simulation.

Mathematical Reviews - 2004

Analysis and Design of Nonlinear Systems in the Frequency Domain - Yunpeng Zhu 2021-03-25

This book focuses on the development of three novel approaches to build up a framework for the frequency domain analysis and design of nonlinear systems. The concepts are derived from Volterra series representation of nonlinear systems which are described by nonlinear difference or differential equations. Occupying the middle ground between traditional linear approaches and more complex nonlinear system theories, the book will help readers to have a good start to analyse and exploit the nonlinearities. Analysis and Design of Nonlinear Systems in the Frequency Domain provides clear illustrations and examples at the beginning and the end of each chapter, respectively, making it of interest to both academics and practicing engineers.

Nonlinear Dynamics and Chaos - Steven H. Strogatz 2018-05-04

This textbook is aimed at newcomers to nonlinear dynamics and chaos, especially students taking a first course in the subject. The presentation stresses analytical methods, concrete examples, and geometric intuition. The theory is developed systematically, starting with first-order differential equations and their bifurcations, followed by phase plane analysis, limit cycles and their bifurcations, and culminating with the Lorenz equations, chaos, iterated maps, period doubling, renormalization, fractals, and strange attractors.

Nonlinear Mechanics of Complex Structures - Holm Altenbach 2021-07-29

This book covers different topics of nonlinear mechanics in complex structures, such as the appearance of new nonlinear phenomena and the behavior of finite-dimensional and distributed nonlinear systems, including numerous systems directly connected with important technological problems.

Linear and Nonlinear Instabilities in Mechanical Systems - Hiroshi Yabuno 2021-02-16

LINEAR and NONLINEAR INSTABILITIES in MECHANICAL SYSTEMS An in-depth insight into nonlinear analysis and control As mechanical systems become lighter, faster, and more flexible, various nonlinear instability phenomena can occur in practical systems. The fundamental knowledge of nonlinear analysis and control is essential to engineers for analysing and controlling nonlinear instability phenomena. This book bridges the gap between the mathematical expressions of nonlinear dynamics and the corresponding practical phenomena. Linear and Nonlinear Instabilities in Mechanical Systems: Analysis, Control and Application provides a detailed and informed insight into the fundamental methods for analysis and control for nonlinear instabilities from the practical point of view. Key features: Refers to the behaviours of practical mechanical systems such as aircraft, railway vehicle, robot

manipulator, micro/nano sensor Enhances the rigorous and practical understanding of mathematical methods from an engineering point of view The theoretical results obtained by nonlinear analysis are interpreted by using accompanying videos on the real nonlinear behaviors of nonlinear mechanical systems Linear and Nonlinear Instabilities in Mechanical Systems is an essential textbook for students on engineering courses, and can also be used for self-study or reference by engineers.

Nonlinear Structural Dynamics and Damping - Juan Carlos Jauregui 2019-03-14

This book compiles recent research in the field of nonlinear dynamics, vibrations and damping applied to engineering structures. It addresses the modeling of nonlinear vibrations in beams, frames and complex mechanical systems, as well as the modeling of damping systems and viscoelastic materials applied to structural dynamics. The book includes several chapters related to solution techniques and signal analysis techniques. Last but not least, it deals with the identification of nonlinear responses applied to condition monitoring systems.

Identification and Analysis of Simple and Complex Multimodal Mechanical Systems Using Time Series Approach - Joseph Olukayode Ewumi 1977

Nonlinear and Parametric Phenomena - Vladimir Damgov 2004

"O Canada" was first heard in 1880, but it was not until 100 years later that it became Canada's official national anthem. In this, the first illustrated edition of "O Canada," acclaimed Canadian artist Ted Harrison takes us on a spectacular journey across Canada, "from east to western sea." Through his joyous eye, Canada is revealed as a land of singular beauty.

IUTAM Symposium on Chaotic Dynamics and Control of Systems and Processes in Mechanics - Giuseppe Rega 2005-03-10

The interest of the applied mechanics community in chaotic dynamics of engineering systems has exploded in the last fifteen years, although research activity on nonlinear dynamical problems in mechanics started well before the end of the Eighties. It developed first within the general context of the classical theory of nonlinear oscillations, or nonlinear vibrations, and of the relevant engineering applications. This was an extremely fertile field in terms of formulation of mechanical and mathematical models, of development of powerful analytical techniques, and of understanding of a number of basic nonlinear phenomena. At about the same time, meaningful theoretical results highlighting new solution methods and new or complex phenomena in the dynamics of deterministic systems were obtained within dynamical systems theory by means of sophisticated geometrical and computational techniques. In recent years, careful experimental studies have been made to establish the actual occurrence and observability of the predicted dynamic phenomena, as it is vitally needed in all engineering fields. Complex dynamics have been shown to characterize the behaviour of a great number of nonlinear mechanical systems, ranging from aerospace engineering applications to naval applications, mechanical engineering, structural engineering, robotics and biomechanics, and other areas. The International Union of Theoretical and Applied Mechanics grasped the importance of such complex phenomena in the Eighties, when the first IUTAM Symposium devoted to the general topic of nonlinear and chaotic dynamics in applied mechanics and engineering was held in Stuttgart (1989).

Dynamics and Control of Multibody Systems - Jerrold E. Marsden 1989-12-31

The study of complex, interconnected mechanical systems with rigid and flexible articulated components is of growing interest to both engineers and mathematicians. Recent work in this area reveals a rich geometry underlying the mathematical models used in this context. In particular, Lie groups of symmetries, reduction, and Poisson structures play a significant role in explicating the qualitative properties of multibody systems. In engineering applications, it is important to exploit the special structures of mechanical systems. For example, certain mechanical problems involving control of interconnected rigid bodies can be formulated as Lie-Poisson systems. The dynamics and control of robotic,

aeronautic, and space structures involve difficulties in modeling, mathematical analysis, and numerical implementation. For example, a new generation of spacecraft with large, flexible components are presenting new challenges to the accurate modeling and prediction of the dynamic behavior of such structures. Recent developments in Hamiltonian dynamics and coupling of systems with symmetries has shed new light on some of these issues, while engineering questions have suggested new mathematical structures. These kinds of considerations motivated the organization of the AMS-IMS-SIAM Joint Summer Research Conference on Control Theory and Multibody Systems, held at Bowdoin College in August, 1988. This volume contains the proceedings of that conference. The papers presented here cover a range of topics, all of which could be viewed as applications of geometrical methods to problems arising in dynamics and control. The volume contains contributions from some of the top researchers and provides an excellent overview of the frontiers of research in this burgeoning area.

Dynamics and Bifurcations of Non-Smooth Mechanical Systems - Remco Leine 2006-06-13

This monograph combines the knowledge of both the field of nonlinear dynamics and non-smooth mechanics, presenting a framework for a class of non-smooth mechanical systems using techniques from both fields. The book reviews recent developments, and opens the field to the nonlinear dynamics community. This book addresses researchers and graduate students in engineering and mathematics interested in the modelling, simulation and dynamics of non-smooth systems and nonlinear dynamics.

Linear and Nonlinear Structural Mechanics - Ali H. Nayfeh 2008-07-11

* Explains the physical meaning of linear and nonlinear structural mechanics. * Shows how to perform nonlinear structural analysis. * Points out important nonlinear structural dynamics behaviors. * Provides ready-to-use governing equations.

Cumulative Book Index - 1996

A world list of books in the English language.

Applications of Chaos and Nonlinear Dynamics in Engineering - - Santo Banerjee 2011-09-10

Chaos and nonlinear dynamics initially developed as a new emergent field with its foundation in physics and applied mathematics. The highly generic, interdisciplinary quality of the insights gained in the last few decades has spawned myriad applications in almost all branches of science and technology—and even well beyond. Wherever quantitative modeling and analysis of complex, nonlinear phenomena is required, chaos theory and its methods can play a key role. This volume concentrates on reviewing the most relevant contemporary applications of chaotic nonlinear systems as they apply to the various cutting-edge branches of engineering. The book covers the theory as applied to robotics, electronic and communication engineering (for example chaos synchronization and cryptography) as well as to civil and mechanical engineering, where its use in damage monitoring and control is explored). Featuring contributions from active and leading research groups, this collection is ideal both as a reference and as a 'recipe book' full of tried and tested, successful engineering applications

Parameter Identification and Monitoring of Mechanical Systems Under Nonlinear Vibration - Juan Carlos A. Jauregui Correa 2014-12-11

Development of new sensors and digital processors has provided opportunity for identification of nonlinear systems. Vibration measurements have become standard for predicting and monitoring machinery in industry. Parameter Identification and Monitoring of Mechanical Systems under Nonlinear Vibration focusses on methods for the identification of nonlinearities in mechanical systems, giving description and examples of practical application. Chapters cover nonlinear dynamics; nonlinear vibrations; signal processing; parameter identification; application of signal processing to mechanical systems; practical experience and industrial applications; and synchronization of nonlinear systems. Covers the most recent advances in machinery monitoring Describes the basis for nonlinear dynamics Presents advantages of applying modern signal processing to mechanical systems

The Analysis of Complex Nonlinear Mechanical Systems - Martin Lesser 1995

The book covers the fundamentals of the mechanics of multibody systems, i.e., systems of interconnected rigid bodies. A geometric view is emphasized in which the techniques and algorithms are motivated by the picture of the rigid body system as a point in the multidimensional space of all possible configurations. The reader is introduced to computer algebra methods in the form of a system, called Sophia, which is implemented in the Maple symbolic manipulation system. The first chapter provides a motivational introduction to the basic principles and an introduction to Maple. Kinematics based on the idea of tangent vectors to the configuration manifold sets the stage for dynamical analysis. The latter ranges from the Lagrange and Gibbs-Appell to Kane's equations. Coverage includes nonholonomic systems and redundant variable methods. The computer algebra methods included enable the treatment of nontrivial mechanical systems and the development of efficient numerical codes for simulation.

Review of LWR Fuel System Mechanical Response with Recommendations for Component Acceptance Criteria - R. L. Grubb 1979

Nonlinear Dynamics, Volume 1 - Gaetan Kerschen 2016-04-22

Nonlinear Dynamics, Volume 1. Proceedings of the 34th IMAC, A Conference and Exposition on Dynamics of Multiphysical Systems: From Active Materials to Vibroacoustics, 2016, the fi rst volume of ten from the Conference, brings together contributions to this important area of research and engineering. Th e collection presents early fi ndings and case studies on fundamental and applied aspects of Structural Dynamics, including papers on: • Nonlinear Oscillations • Nonlinear Modal Analysis • Nonlinear System Identifi cation • Nonlinear Modeling & Simulation • Nonlinearity in Practice • Nonlinearity in Multi-Physics Systems • Nonlinear Modes and Modal Interactions

Nonlinear Dynamics in Complex Systems - Armin Fuchs 2012-09-22

With many areas of science reaching across their boundaries and becoming more and more interdisciplinary, students and researchers in these fields are confronted with techniques and tools not covered by their particular education. Especially in the life- and neurosciences quantitative models based on nonlinear dynamics and complex systems are becoming as frequently implemented as traditional statistical analysis. Unfamiliarity with the terminology and rigorous mathematics may discourage many scientists to adopt these methods for their own work, even though such reluctance in most cases is not justified. This book bridges this gap by introducing the procedures and methods used for analyzing nonlinear dynamical systems. In Part I, the concepts of fixed points, phase space, stability and transitions, among others, are discussed in great detail and implemented on the basis of example elementary systems. Part II is devoted to specific, non-trivial applications: coordination of human limb movement (Haken-Kelso-Bunz model), self-organization and pattern formation in complex systems (Synergetics), and models of dynamical properties of neurons (Hodgkin-Huxley, Fitzhugh-Nagumo and Hindmarsh-Rose). Part III may serve as a refresher and companion of some mathematical basics that have been forgotten or were not covered in basic math courses. Finally, the appendix contains an explicit derivation and basic numerical methods together with some programming examples as well as solutions to the exercises provided at the end of certain chapters. Throughout this book all derivations are as detailed and explicit as possible, and everybody with some knowledge of calculus should be able to extract meaningful guidance follow and apply the methods of nonlinear dynamics to their own work. “This book is a masterful treatment, one might even say a gift, to the interdisciplinary scientist of the future.” “With the authoritative voice of a genuine practitioner, Fuchs is a master teacher of how to handle complex dynamical systems.” “What I find beautiful in this book is its clarity, the clear definition of terms, every step explained simply and systematically.” (J.A.Scott Kelso, excerpts from the foreword)

Modal Analysis of Nonlinear Mechanical Systems - Gaetan Kerschen 2014-10-13

The book first introduces the concept of nonlinear normal modes (NNMs) and their two main definitions. The fundamental differences between classical linear normal modes (LNMs) and NNMs are explained and

illustrated using simple examples. Different methods for computing NNMs from a mathematical model are presented. Both advanced analytical and numerical methods are described. Particular attention is devoted to the invariant manifold and normal form theories. The book also discusses nonlinear system identification.

Nonlinear Control and Analytical Mechanics - Harry G. Kwatny 2000-09-08

During the past decade we have had to confront a series of control design prob lems - involving, primarily, multibody electro-mechanical systems - in which nonlinearity plays an essential role. Fortunately, the geometric theory of non linear control system analysis progressed substantially during the 1980s and 90s, providing crucial conceptual tools that addressed many of our needs. However, as any control systems engineer can attest, issues of modeling, computation, and implementation quickly become the dominant concerns in practice. The prob lems of interest to us present unique challenges because of the need to build and manipulate complex mathematical models for both the plant and controller. As a result, along with colleagues and students, we set out to develop computer algebra tools to facilitate model building, nonlinear control system design, and code generation, the latter for both numerical simulation and real time con an outgrowth of that continuing effort. As trol implementation. This book is a result, the unique features of the book includes an integrated treatment of nonlinear control and analytical mechanics and a set of symbolic computing software tools for modeling and control system design. By simultaneously considering both mechanics and control we achieve a fuller appreciation of the underlying geometric ideas and constructions that are common to both. Control theory has had a fruitful association with analytical mechanics from its birth in the late 19th century.

Computer-aided Analysis of Rigid and Flexible Mechanical Systems - Manuel F. O. Seabra Pereira 1994

This book contains the edited version of the lectures presented at the NATO Advanced Study Institute on computer-aided analysis of rigid and flexible mechanical systems, held in Troacuteia, Portugal, from June 27-July 9, 1993. The topics presented include formulations and numerical aspects of rigid and flexible multibody dynamics, object-oriented paradigms, optimal design and synthesis, robotics, kinematics, path planning, control, impact dynamics and aspects of application."

Paper - 1993

Dynamics and Control of Hybrid Mechanical Systems - Gennadi? Alekseevich Leonov 2010

The papers in this edited volume aim to provide a better understanding of the dynamics and control of a large class of hybrid dynamical systems that are described by different models in different state space domains. They not only cover important aspects and tools for hybrid systems analysis and control, but also a number of experimental realizations. Special attention is given to synchronization a universal phenomenon in nonlinear science that gained tremendous significance since its discovery by Huygens in the 17th century. Possible applications of the results introduced in the book include control of mobile robots, control of CD/DVD players, flexible manufacturing lines, and complex networks of interacting agents. The book is based on the material presented at a similarly entitled minisymposium at the 6th European Nonlinear Dynamics Conference held in St Petersburg in 2008. It is unique in that it contains results of several international and interdisciplinary collaborations in the field, and reflects state-of-the-art technological development in the area of hybrid mechanical systems at the forefront of the 21st century.

Dynamics and Vibrations - Seyed Habibollah Hashemi Kachapi 2013-07-30

Dynamical and vibratory systems are basically an application of mathematics and applied sciences to the solution of real world problems. Before being able to solve real world problems, it is necessary to carefully study dynamical and vibratory systems and solve all available problems in case of linear and nonlinear equations using analytical and numerical methods. It is of great importance to study nonlinearity in dynamics and vibration; because almost all applied processes act

nonlinearly, and on the other hand, nonlinear analysis of complex systems is one of the most important and complicated tasks, especially in engineering and applied sciences problems. There are probably a handful of books on nonlinear dynamics and vibrations analysis. Some of these books are written at a fundamental level that may not meet ambitious engineering program requirements. Others are specialized in certain fields of oscillatory systems, including modeling and simulations. In this book, we attempt to strike a balance between theory and practice, fundamentals and advanced subjects, and generality and specialization. None of the books in this area have completely studied and analyzed nonlinear equation in dynamical and vibratory systems using the latest analytical and numerical methods, so that the user can solve the problems without the need of studying too many different references. Thereby in this book, by the use of the latest analytic, numeric laboratorial methods and using more than 300 references like books, papers and the researches done by the authors and by considering almost all possible processes and situation, new theories has been proposed to encounter applied problems in engineering and applied sciences. In this way, the user (bachelor's, master's and PhD students, university teachers and even in research centers in different fields of mechanical, civil, aerospace, electrical, chemical, applied mathematics, physics, and etc.) can encounter such systems confidently. In the different chapters of the book, not only are the linear and especially nonlinear problems with oscillatory form broadly discussed, but also applied examples are practically solved by the proposed methodology.

Vibrations and Waves in Continuous Mechanical Systems - Peter Hagedorn 2007-10-22

The subject of vibrations is of fundamental importance in engineering and technology. Discrete modelling is sufficient to understand the dynamics of many vibrating systems; however a large number of vibration phenomena are far more easily understood when modelled as continuous systems. The theory of vibrations in continuous systems is crucial to the understanding of engineering problems in areas as diverse as automotive brakes, overhead transmission lines, liquid filled tanks, ultrasonic testing or room acoustics. Starting from an elementary level, Vibrations and Waves in Continuous Mechanical Systems helps develop a comprehensive understanding of the theory of these systems and the tools with which to analyse them, before progressing to more advanced topics. Presents dynamics and analysis techniques for a wide range of continuous systems including strings, bars, beams, membranes, plates, fluids and elastic bodies in one, two and three dimensions. Covers special topics such as the interaction of discrete and continuous systems, vibrations in translating media, and sound emission from vibrating surfaces, among others. Develops the reader's understanding by progressing from very simple results to more complex analysis without skipping the key steps in the derivations. Offers a number of new topics and exercises that form essential steppingstones to the present level of research in the field. Includes exercises at the end of the chapters based on both the academic and practical experience of the authors. Vibrations and Waves in Continuous Mechanical Systems provides a first course on the vibrations of continuous systems that will be suitable for students of continuous system dynamics, at senior undergraduate and graduate levels, in mechanical, civil and aerospace engineering. It will also appeal to researchers developing theory and analysis within the field.

Dynamics and Bifurcations of Non-Smooth Mechanical Systems - Remco I. Leine 2013-03-19

This monograph combines the knowledge of both the field of nonlinear dynamics and non-smooth mechanics, presenting a framework for a class of non-smooth mechanical systems using techniques from both fields. The book reviews recent developments, and opens the field to the nonlinear dynamics community. This book addresses researchers and graduate students in engineering and mathematics interested in the modelling, simulation and dynamics of non-smooth systems and nonlinear dynamics.

Synchronization of Mechanical Systems - Hendrik Nijmeijer 2003

The main goal of this book is to prove analytically and validate experimentally that synchronization in multi-composed mechanical systems can be achieved in the case of partial knowledge of the state

vector of the systems, i.e. when only positions are measured. For this purpose, synchronization schemes based on interconnections between the systems, feedback controllers and observers are proposed. Because mechanical systems include a large variety of systems, and since it is impossible to address all of them, the book focuses on robot manipulators. Nonetheless the ideas developed here can be extended to other mechanical systems, such as mobile robots, motors and generators. Contents: Preliminaries; External Synchronization of Rigid Joint Robots; External Synchronization of Flexible Joint Robots; Mutual Synchronization of Rigid Joint Robots; An Experimental Case Study; Synchronization in Other Mechanical Systems. Readership: Students and researchers in mechanical engineering and control theory.