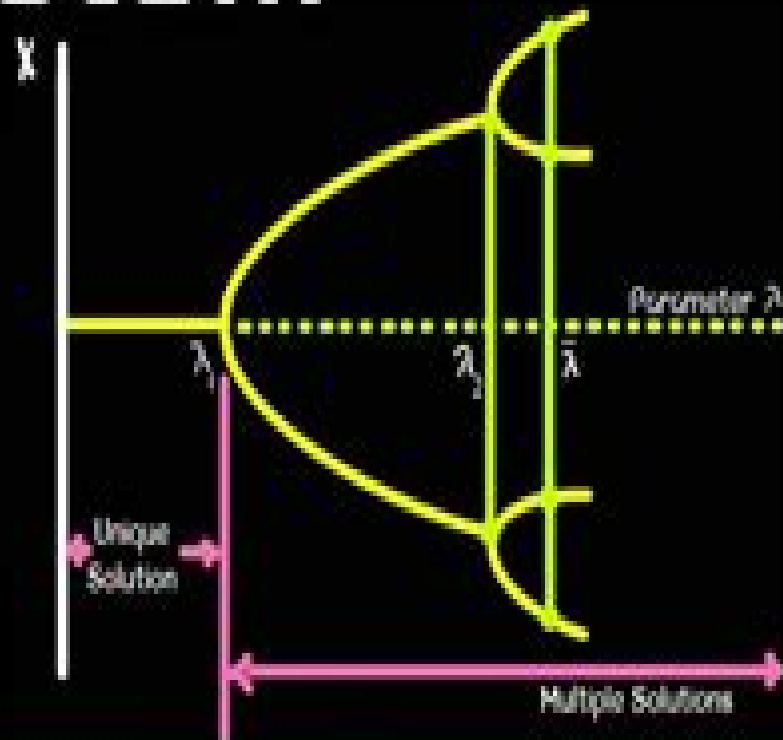


Introduction to Nonlinear Control System



Nonlinear Control Systems

Alessandro Astolfi, Lorenzo Marconi



Nonlinear Control Systems:

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Investigation of Nonlinear Control Systems: Continuously acting control systems Nicolai Minorsky, Giovanni Sansone, 1960 *Nonlinear and Optimal Control Systems* Thomas L. Vincent, Walter J. Grantham, 1997-06-23 Designed for one semester introductory senior or graduate level course the authors provide the student with an introduction of analysis techniques used in the design of nonlinear and optimal feedback control systems There is special emphasis on the

fundamental topics of stability controllability and optimality and on the corresponding geometry associated with these topics Each chapter contains several examples and a variety of exercises

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Mourad Boufadene, 2018-09-24 The development of computer software for nonlinear control systems has provided many benefits for teaching research and the development of control systems design MATLAB is considered the dominant software platforms for linear and nonlinear control systems analysis This book provides an easy way to learn nonlinear control systems such as feedback linearization technique and Sliding mode control Structure variable control which are one of the most used techniques in nonlinear control dynamical systems therefore teachers students and researchers are all in need to handle such techniques and since they are too difficult for them to handle such nonlinear controllers especially for a more complicated systems such as induction motor satellite and vehicles dynamical models Thus this document it is an excellent resource for learning the principle of feedback linearization and sliding mode techniques in an easy and simple way Provides a briefs description of the feedback linearization and sliding mode control strategies Includes a simple method on how to determine the right and appropriate controller P PI PID for feedback linearization control strategy A Symbolic MATLAB Based function for finding the feedback linearization and sliding mode controllers are developed and tested using several examples A simple method for finding the approximate sliding mode controller parameters is introduced Where the program used to construct the nonlinear controller uses symbolic computations such that the user should provide the program with the necessary functions $f(x)$ $g(x)$ and $h(x)$ using the symbolic library

Analysis and Design of Nonlinear Control Systems Alessandro Astolfi, Lorenzo Marconi, 2007-11-13 This book is a tribute to Prof Alberto Isidori on the occasion of his 65th birthday Prof Isidori's prolific pioneering and high impact research activity has spanned over 35 years Throughout his career Prof Isidori has developed ground breaking results has initiated research directions and has contributed towards the foundation of nonlinear control theory In addition his dedication to explain intricate issues and difficult concepts in a simple and rigorous way and to motivate young researchers has been instrumental to the intellectual growth of the nonlinear control community worldwide The volume collects 27 contributions written by a total of 52 researchers The principal author of each contribution has been selected among the researchers who have worked with Prof Isidori have witnessed his research activity or have had the privilege and honour of being his PhD students The contributions address a significant number of control topics including theoretical issues advanced applications emerging control directions and tutorial works The diversity of the areas covered the number of contributors and their international standing provide evidence of the impact of Prof Isidori in the control and systems theory communities The book has been divided into six parts System Analysis Optimization Methods Feedback Design Regulation Geometric Methods and Asymptotic Analysis reflecting important control areas which have been strongly influenced and in some cases pioneered by Prof Isidori

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the purpose of globally stabilizing nonlinear systems via state or output feedback The author is one of the most prominent researchers in the field

Nonlinear Control Systems Zoran Vukic, 2003-02-04 This text emphasizes classical methods and presents essential analytical tools and strategies for the construction and development of improved design methods in nonlinear control It offers engineering procedures for the frequency domain as well as solved examples for clear understanding of control applications in the industrial electrical process manufacturing and automotive industries The authors discuss properties of nonlinear systems stability linearization methods operating modes and dynamic analysis methods phase trajectories in dynamic analysis of nonlinear systems and harmonic linearization in dynamic analysis of nonlinear control systems operating in stabilization mode

Operator-Based Nonlinear Control Systems Mingcong Deng, 2014-01-15 Enables readers to master and apply the operator theoretic approach Control of nonlinear systems is a multidisciplinary field involving electrical engineering computer science and control engineering Specifically this book addresses uncertain nonlinearity Beginning with how real plants are modeled as operator based plants the author develops a systematic methodology that enables readers to understand a quantitative stability result a critical factor in any nonlinear control system s stability and performance Operator Based Nonlinear Control Systems Design and Applications focuses on the operator theoretic approach offering detailed examples on how to apply it to network controlled systems In addition to current research results the author explores future research directions and applications of the operator theoretic approach The book begins with an introduction that defines nonlinear systems Next it covers Robust right coprime factorization for nonlinear plants with uncertainties Robust stability of operator based nonlinear control systems Tracking issues and fault detection issues in nonlinear control systems Operator based nonlinear control systems with smart actuators Nonlinear feedback control for large scale systems using a distributed control system device Throughout the book discussions of actual applications help readers understand how the operator theoretic approach works in practice Operator Based Nonlinear Control Systems is recommended for students and professionals in control theory engineering and applied mathematics Working with this expertly written and organized book they will learn how to obtain robust right coprime factorization for modeled plants Moreover they will discover state of the technology research results on robust stability conditions as well as the latest system output tracking and fault detection issues that are challenging today s researchers

Linearization of Nonlinear Control Systems Hong-Gi Lee, 2022-09-02 This textbook helps graduate level student to understand easily the linearization of nonlinear control system Differential geometry is essential to understand the linearization problems of the control nonlinear systems In this book the basics of differential geometry needed in linearization are explained on the Euclidean space instead of the manifold for students who are not accustomed to differential geometry Many Lie algebra formulas used often in linearization are also provided with proof The conditions in the linearization problems are complicated to check because the Lie bracket calculation of vector fields by hand needs much concentration and time This book provides

MATLAB programs for most of the theorems The book also includes end of chapter problems and other pedagogical aids to help understanding and self study

Nonlinear Dynamical Control Systems Hendrik Nijmeijer, A. J. van der Schaft, 1990-04-06 This volume deals with controllability and observability properties of nonlinear systems as well as various ways to obtain input output representations The emphasis is on fundamental notions as controlled invariant distributions and submanifolds together with algorithms to compute the required feedbacks

Theory and Applications of Nonlinear Control Systems Christopher I. Byrnes, Anders Lindquist, 1986 *Nonlinear Control Systems 2001 (NOLCOS 2001)*, 2002

Nonlinear Control Systems and Power System Dynamics Qiang Lu, Yuanzhang Sun, Shengwei Mei, 2013-04-17 Nonlinear Control Systems and Power System Dynamics presents a comprehensive description of nonlinear control of electric power systems using nonlinear control theory which is developed by the differential geometric approach and nonlinear robust control method This book explains in detail the concepts theorems and algorithms in nonlinear control theory illustrated by step by step examples In addition all the mathematical formulation involved in deriving the nonlinear control laws of power systems are sufficiently presented Considerations and cautions involved in applying nonlinear control theory to practical engineering control designs are discussed and special attention is given to the implementation of nonlinear control laws using microprocessors Nonlinear Control Systems and Power System Dynamics serves as a text for advanced level courses and is an excellent reference for engineers and researchers who are interested in the application of modern nonlinear control theory to practical engineering control designs

Stability of Nonlinear Control Systems Solomon Lefschetz, 1965 Stability of nonlinear control systems

Analysis and Design of Nonlinear Control Systems Daizhan Cheng, Xiaoming Hu, Tielong Shen, 2011-03-28 Analysis and Design of Nonlinear Control Systems provides a comprehensive and up to date introduction to nonlinear control systems including system analysis and major control design techniques The book is self contained providing sufficient mathematical foundations for understanding the contents of each chapter Scientists and engineers engaged in the field of Nonlinear Control Systems will find it an extremely useful handy reference book Dr Daizhan Cheng a professor at Institute of Systems Science Chinese Academy of Sciences has been working on the control of nonlinear systems for over 30 years and is currently a Fellow of IEEE and a Fellow of IFAC he is also the chairman of Technical Committee on Control Theory Chinese Association of Automation

Local Stabilizability of Nonlinear Control Systems Andrea Bacciotti, 1992 This is one of the first books presenting stabilizability of nonlinear systems in a well organized and detailed way the problem its motivation features and results Control systems defined by ordinary differential equations are dealt with Many worked examples have been included The main focus is on the mathematical aspects of the problem but some important applications are also described This book will be suitable as a textbook for advanced university courses and also as a tool for control theorists and researchers An extensive list of references is included

Applied Nonlinear Control Jean-Jacques E. Slotine, Weiping Li, 1991 Nonlinear systems analysis Phase plane analysis Fundamentals of Lyapunov

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