

<<非线性控制系统的分析与设计>>

图书基本信息

书名：<<非线性控制系统的分析与设计>>

13位ISBN编号：9787030259646

10位ISBN编号：7030259645

出版时间：1970-1

出版时间：科学出版社

作者：本社 主编

页数：545

版权说明：本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问：<http://www.tushu007.com>

前言

The purpose of this book is to present a comprehensive introduction to the theory and design technique of nonlinear control systems. It may serve as a standard reference of nonlinear control theory and applications for control scientists and control engineers as well as Ph.D students majoring in Automation or some related fields such as Operational Research, Management, Communication etc. In the book we emphasize on the geometric approach to nonlinear control systems. In fact, we intend to put nonlinear control theory and its design techniques into a geometric framework as much as we can. The main motivation to write this book is to bring readers with basic engineering background promptly to the frontier of the modern geometric approach on the dynamic systems, particularly on the analysis and control design of nonlinear systems. We have made a considerable effort on the following aspects: First of all, we try to visualize the concepts. Certain concepts are defined over local coordinates, but in a coordinate free style. The purpose for this is to make them easily understandable, particularly at the first reading. Through this way a reader can understand a concept by just considering the case in n . Later on, when the material has been digested, it is easy to lift them to general topological spaces or manifolds. Secondly, we emphasize the numerical or computational aspect. We believe that making things computable is very useful not only for solving engineering problems but also for understanding the concepts and methods. Thirdly, certain proofs have been simplified and some elementary proofs are pre-sented to make the materials more readable for engineers or readers not specializing in mathematics. Finally, the topics which can be found easily in some other standard textbooks or references are briefly introduced and the corresponding references are included. Much attention has been put on new topics, new results, and new design techniques. For convenience, a brief survey on linear control theory is included, which can be skipped for readers who are already familiar with the subject. For those who are not majoring in control theory, it provides a tutorial introduction to the field, which is sufficient for the further study of this book. The other mathematical pre-requirements are Calculus, Linear Algebra, Ordinal Differential Equation.

<<非线性控制系统的分析与设计>>

内容概要

本书全面介绍了非线性控制系统的分析与设计。

全书共分为两部分。

其中第一部分为第1~4章。

第1章介绍了拓扑空间,第2章介绍了微流形,第3章介绍了代数、Lie群和Lie代数,它们为本书提供了研究数学背景。

第二部分包括12章,即第5~16章,这些章节涵盖了可控性、可观测性、稳定性、解耦、投入产出的实现、线性化、中心流技术、输出调节、耗散系统、 H^∞ 控制、切换系统和非平稳控制等方面,并给出了有关的详细设计技术。

本书可供理工科大学自动控制专业的教师及研究生阅读,也可供自然科学和工程技术领域中相关专业的研究人员参考。

<<非线性控制系统的分析与设计>>

作者简介

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.

<<非线性控制系统的分析与设计>>

书籍目录

1. Introduction 1.1 Linear Control Systems 1.1.1 Controllability, Observability 1.1.2 Invariant Subspaces 1.1.3 Zeros, Poles, Observers 1.1.4 Normal Form and Zero Dynamics 1.2 Nonlinearity vs Linearity 1.2.1 Localization 1.2.2 Singularity 1.2.3 Complex Behaviors 1.3 Some Examples of Nonlinear Control Systems References

2. Topological Space 2.1 Metric Space 2.2 Topological Spaces 2.3 Continuous Mapping 2.4 Quotient Spaces References

3. Differentiable Manifold 3.1 Structure of Manifolds 3.2 Fiber Bundle 3.3 Vector Field 3.4 One Parameter Group 3.5 Lie Algebra of Vector Fields 3.6 Co-tangent Space 3.7 Lie Derivatives 3.8 Frobenius' Theory 3.9 Lie Series, Chow's Theorem 3.10 Tensor Field 3.11 Riemannian Geometry 3.12 Symplectic Geometry References

4. Algebra, Lie Group and Lie Algebra 4.1 Group 4.2 Ring and Algebra 4.3 Homotopy 4.4 Fundamental Group 4.5 Covering Space 4.6 Lie Group 4.7 Lie Algebra of Lie Group 4.8 Structure of Lie Algebra References

5. Controllability and Observability 5.1 Controllability of Nonlinear Systems 5.2 Observability of Nonlinear Systems 5.3 Kalman Decomposition References

6. Global Controllability of Affine Control Systems 6.1 From Linear to Nonlinear Systems 6.2 A Sufficient Condition 6.3 Multi-hierarchy Case 6.4 Codim = 1 References

7. Stability and Stabilization 7.1 Stability of Dynamic Systems 7.2 Stability in the Linear Approximation 7.3 The Direct Method of Lyapunov 7.3.1 Positive Definite Functions 7.3.2 Critical Stability 7.3.3 Instability 7.3.4 Asymptotic Stability 7.3.5 Total Stability 7.3.6 Global Stability 7.4 LaSalle's Invariance Principle 7.5 Converse Theorems to Lyapunov's Stability Theorems 7.5.1 Converse Theorems to Local Asymptotic Stability 7.5.2 Converse Theorem to Global Asymptotic Stability 7.6 Stability of Invariant Set 7.7 Input-Output Stability 7.7.1 Stability of Input-Output Mapping 7.7.2 The Lur'e Problem 7.7.3 Control Lyapunov Function 7.8 Region of Attraction References

8. Decoupling 8.1 (f,g)-invariant Distribution 8.2 Local Disturbance Decoupling 8.3 Controlled Invariant Distribution 8.4 Block Decomposition 8.5 Feedback Decomposition References

9. Input-Output Structure 9.1 Decoupling Matrix 9.2 Morgan's Problem 9.3 Invertibility 9.4 Decoupling via Dynamic Feedback 9.5 Normal Form of Nonlinear Control Systems 9.6 Generalized Normal Form 9.7 Fliess Functional Expansion 9.8 Tracking via Fliess Functional Expansion References

10. Linearization of Nonlinear Systems 10.1 Poincare Linearization 10.2 Linear Equivalence of Nonlinear Systems 10.3 State Feedback Linearization 10.4 Linearization with Outputs 10.5 Global Linearization 10.6 Non-regular Feedback Linearization References

11. Design of Center Manifold 11.1 Center Manifold 11.2 Stabilization of Minimum Phase Systems 11.3 Lyapunov Function with Homogeneous Derivative 11.4 Stabilization of Systems with Zero Center 11.5 Stabilization of Systems with Oscillatory Center 11.6 Stabilization Using Generalized Normal Form 11.7 Advanced Design Techniques References

12. Output Regulation 12.1 Output Regulation of Linear Systems 12.2 Nonlinear Local Output Regulation 12.3 Robust Local Output Regulation References

13. Dissipative Systems 13.1 Dissipative Systems 13.2 Passivity Conditions 13.3 Passivity-based Control 13.4 Lagrange Systems 13.5 Hamiltonian Systems References

14. L₂-Gain Synthesis 14.1 H_∞ Norm and L₂-Gain 14.2 H_∞ Feedback Control Problem 14.3 L₂-Gain Feedback Synthesis 14.4 Constructive Design Method 14.5 Applications References

15. Switched Systems 15.1 Common Quadratic Lyapunov Function 15.2 Quadratic Stabilization of Planar Switched Systems 15.3 Controllability of Switched Linear Systems 15.4 Controllability of Switched Bilinear Systems 15.5 LaSalle's Invariance Principle for Switched Systems 15.6 Consensus of Multi-Agent Systems 15.6.1 Two Dimensional Agent Model with a Leader 15.6.2 n Dimensional Agent Model without Lead References

16. Discontinuous Dynamical Systems 16.1 Introduction 16.2 Filippov Framework 16.2.1 Filippov Solution 16.2.2 Lyapunov Stability Criteria 16.3 Feedback Stabilization 16.3.1 Feedback Controller Design: Nominal Case 16.3.2 Robust Stabilization 16.4 Design Example of Mechanical Systems 16.4.1 PD Controlled Mechanical Systems 16.4.2 Stationary Set 16.4.3 Application Example References

Appendix A Some Useful Theorems A.1 Sard's Theorem A.2 Rank Theorem References

Appendix B Semi-Tensor Product of Matrices B.1 A Generalized Matrix Product B.2 Swap Matrix B.3 Some Properties of Semi-Tensor Product B.4 Matrix Form of Polynomials References

Index

<<非线性控制系统的分析与设计>>

编辑推荐

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.

<<非线性控制系统的分析与设计>>

版权说明

本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问:<http://www.tushu007.com>