

《非线性控制系统的分析与设计（英文版）》

书籍信息

版次：

页数：545

字数：

印刷时间：

开本：16开

纸张：胶版纸

包装：平装

是否套装：否

国际标准书号ISBN：9787030259646

内容简介

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。

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 H_2 -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

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www.tushupdf.com](http://www.tushupdf.com)