# <<非线性系统>>

## 图书基本信息

书名：<<非线性系统>>

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## 内容概要

本非线性系统的研究近年来受到越来越广泛的关注，国外许多工科院校已将“ 非线性系统 ”作为相关专业研究生的学位课程。
本书是美国密歇根州立大学电气与计算机工程专业的研究生教材，全书内容按照数学知识的由浅入深分成了四个部分。
基本分析部分介绍了非线性系统的基本概念和基本分析方法；反馈系统分析部分介绍了输入-输出稳定性、无源性和反馈系统的频域分析；现代分析部分介绍了现代稳定性分析的基本概念、扰动系统的稳定性、扰动理论和平均化以及奇异扰动理论；非线性反馈控制部分介绍了反馈线性化，并给出了几种非线性设计工具，如滑模控制、李雅普诺夫再设计、反步设计法、基于无源性的控制和高增益观测器等。
此外本书附录还汇集了一些书中用到的数学知识，包括基本数学知识的复习、压缩映射和一些较为复杂的定理证明。
本书已根据作者于2012年4月2日更新过的勘误表进行过更正。

## 作者简介

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## 书籍目录

## 章节摘录

版权页： 插图： Chapter 4 Lyapunov Stability Stability theory plays a central role in systems theory and engineering.There are different kinds of stability problems that arise in the study of dynamical systems.This chapter is concerned mainly with stability of equilibrium points.In later chapters,we shall see other kinds of stability,such as input-output stability and stability of periodic orbits.Stability of equilibrium points is usually characterized in the sense of Lyapunov,a Russian mathematician and engineer who laid the foundation of the theory,which now carries his name.An equilibrium point is stable if all solutions starting at nearby points stay nearby; otherwise,it is unstable.It is asymptotically stable if all solutions starting at nearby points not only stay nearby,but also tend to the equilibrium point as time approaches infinity.These notions are made precise in Section 4.1,where the basic theorems of Lyapunov's method for autonomous systems are given.An extension of the basic theory,due to LaSalle,is given in Section 4.2.For a linear time-invariant system $(x)(t) = Ax(t)$,the stability of the equilibrium point $x = 0$ can be completely characterized by the location of the eigenvalues of A.This is discussed in Section 4.3.In the same section,it is shown when and how the stability of an equilibrium point can be determined by linearization about that point.In Section 4.4,we introduce class K.and class K.L functions,which are used extensively in the rest of the chapter,and indeed the rest of the book.In Sections 4.5 and 4.6,we extend Lyapunov's method to nonautonomous systems.In Section 4.5,we define the concepts of uniform stability,uniform asymptotic stability,and exponential stability for nonautonomous systems,and give Lyapunov's method for testing them.In Section 4.6,we study linear timevarying systems and linearization.

## 编辑推荐

《国外计算机科学教材系列:非线性系统(第3版)(英文版)》既可以作为研究第一学期非线性系统课程的教材，也可以作为工程技术人员、应用数学专业人员的自学教材或参考书。