<<微分方程的定性理论>>

图书基本信息

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前言

Differential equations are mainly used to describe the changes of quanti-ties or behavior of certain systems in applications, such as those governedby Newton's laws in physics.When the differential equations under study are linear, the conventionalmethods, such as the Laplace transform method and the power series solu-tions, can be used to solve the differential equations analytically, that is, thesolutions can be written out using formulas.When the differential equations under study are nonlinear, analytical so-lutions cannot, in general, be found; that is, solutions cannot be writtenout using formulas. In those cases, one approach is to use numerical ap-proximations. In fact, the recent advances in computer technology makethe numerical approximation classes very popular because powerful softwareallows students to quickly approximate solutions of nonlinear differentialequations and visualize their properties.However, in most applications in biology, chemistry, and physics mod-eled by nonlinear differential equations where analytical solutions may beunavailable, people are interested in the questions related to the so-calledqualitative properties, such as: will the system have at least one solu-tion ?
will the system have at most one solution ?
can certain behavior ofthe system be controlled or stabilized ?
or will the system exhibit some peri-odicity ?
If these questions can be answered without solving the differentialequations, especially when analytical solutions are unavailable, we can stillget a very good understanding of the system. Therefore, besides learningsome numerical methods, it is also important and beneficial to learn howto analyze some qualitative properties.

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内容概要

书中主要讲解了微分方程理论的基本方法，对微分方程的存在性、连续依赖性、稳定性、周期解、自治微分系统、动力系统等基本问题进行详细分析，并注重理论间的联系。
《微分方程的定性理论》基础性强、应用广泛，是一本适合大学高年级选修课、研究生双语教学以及读者自学的英文教科书。

作者简介

刘和涛，教授，留美执教数十年，曾在培生教育等国际著名、出版机构出版过多种教材，为美国多所院校采用。
本教材秉承了国外先进教学理念，并针对国内学生实际情况，尤其注、意了由浅入深的理论过渡，建立了完备的逻辑体系，语言地、道，是适合于双语教学的优秀教科书，亦适合学生自学。

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章节摘录

插图：The study of linear differential equations is very important for the fol-lowing reasons. First, the study provides us with some basic knowledgefor understanding general nonlinear differential equations. Second, manynonlinear differential equations can be written as summations of linear dif-ferential equations and some small nonlinear perturbations. Thus, undercertain conditions, the qualitative properties of linear differential equationscan be used to infer essentially the same qualitative properties for nonlineardifferential equations.

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