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<<动态域上的不连续动力学系统>>

图书基本信息

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前言

This book is about discontinuous dynamical systems on timevarying domains. Ihad not planed to write this book originally. As a scientist working on dynamicsand vibration, the 5.12 earthquake of Wenchuan （Sichuan province, China） shockedmy heart and made me feel guilty because my research cannot make any direct contributions to help them. Therefore, I would like to write two words "Zhenhan" inChinese calligraphy on the dedication page to express my passion. The meaningof "Zhenhan" is "Earthquake and Heartbreak" that shocks one's passion and spirit,and recalls everyone to a sense of duty. Herein, I would like to accumulate recent research developments of discontinuous dynamical systems on timevarying domains.One likes to use continuous models for discontinuous dynamical systems. However,sometimes such continuous modeling cannot provide adequate descriptions of discontinuous dynamical systems. Recently, researchers have gradually realized thatdiscontinuous modeling may provide an adequate and acceptable predication ofengineering systems. Currently, most research still focuses on discontinuous dynamical systems on timeinvariant domains. To better describe practical problems,some research on discontinuous systems on timevarying domains is scattered hereand there but without a systematical theory. The purpose of this book is to systematically present a theory of discontinuous dynamical systems on timevaryingdomains for university students and researchers.This book mainly focuses on the switchability of discontinuous dynamical systems on timevarying domains. Based on such concepts, principles of dynamicalsystem interactions without any connections are presented. This book consists ofseven chapters. Chapter 1 discusses two examples to show where discontinuous dynamical systems exist. Chapter 2 presents a basic theory for the switchability of aflow to the separation boundary in discontinuous dynamical systems, and switchingbifurcations are also addressed. In Chapter 3, transversality and sliding phenomena for a controlled dynamical system to an inclined line boundary of control logicare presented to show how to apply such a new theory. In Chapter 4, dynamics of africtional oscillator on a traveling belt with timevarying speeds is presented, whichis a simple example of discontinuous dynamical systems on the timevarying domains.

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内容概要

Discontinuous Dynamical Systems on Time-varying Domains is the first monograph focusing on this topic. While in the classic theory of dynamical systems the focus is on dynamical systems on time-invariant domains, this book presents discontinuous dynamical systems on time-varying domains where the corresponding switchability of a flow to the time-varying boundary in discontinuous dynamical systems is discussed. From such a theory, principles of dynamical system interactions without any physical connections are presented. Several discontinuous systems on time-varying domains are analyzed in detail to show how to apply the theory to practical problems. The book can serve as a reference book for researchers, advanced undergraduate and graduate students in mathematics, physics and mechanics.

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作者简介

Dr. Albert C. J. Luo is a professor at Southern Illinois University Edwardsville, USA. His research is involved in the nonlinear theory of dynamical systems. His main contributions are in the following aspects: a stochastic and resonant layer theory in nonlinear Hamiltonian systems, singularity on discontinuous dynamical systems, and approximate nonlinear theories for a deformable-body.

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