<<拟线性双曲系统的能控性与能观性>>

图书基本信息

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前言

The controllability and observability are of great importance in both theoryand applications. A complete theory has been established for linear hyperbolicsystems, in particular, for linear wave equations. There have also been someresults for semilinear wave equations. For quasilinear hyperbolic systems, how-ever, very few results have been published even in the one-space-dimensional（l-D） case.In this monograph based mainly on the results obtained by the authorand his collaborators in recent years, by means of the theory on the semi-global classical solution, a simple and direct constructive method is presentedin a systematic way to get both the controllability and observability in theframework of classical solutions for general first order 1-D quasilinear hyper-bolic systems with general nonlinear boundary conditions, and correspondingapplications are given for 1-D quasilinear wave equations and for unsteadyflows in a tree-like network of open canals, respectively. This will be of bene-fit to scholars and graduate students in applied mathematics and in appliedsciences.The Appendix given at the end of this monograph is specially written forthose readers who are not familiar with quasilinear hyperbolic systems.I would like to take this opportunity to express my sincere thanks tothe late professor J.-L. Lions, who initiated and brought me into the areaof control theory, for his encouragement and guidance. My special thanksare due to Bopeng Rao, Binyu Zhang, Yi Jin, Lixin Yu, Zhiqiang Wang andQilong Gu for their kind cooperation in the course of research on this subject,supported by the National Basic Research Program of China （973 Program）（2007CB814800）. Finally, I am also indebted to Ms. Chunlian Zhou for herpatient and efficient work in editing this book.

内容概要

The controllability and observability are of great importance in boththeory and applications. A complete theory has been established for linearhyperbolic systems, in particular, for linear wave equations. There havealso been some results for semilinear wave equations. For quasilinearhyperbolic systems that have numerous applications in mechanics, physicsand other applied sciences, however, very few results are available evenwith space dimension one. This monograph is based mainly on the results obtained by the author andhis collaborators in recent years. By mea~s of the theory on the semi-globalclassical solution, a simple and direct constructive method is presentedin a systematic way to get both the controllability and observability in theframework of classical solutions for general first order 1-D quasilinearhyperbolic systems with general nonlinear boundary conditions.Corresponding applications are given for 1-D quasilinear wave equationsand for unsteady flows in a tree-like network of open canals, respectively.More than one hundred related references are provided.

This book with 11 chapters is self-contained. An appendix is especiallywritten for those readers who are not familiar with quasilinear hyperbolic systems. This book will be of benefit to scholars and graduate students in appliedmathematics and applied sciences. It may be used as a textbook or a mainreference for graduate students in corresponding areas.

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书籍目录

章节摘录

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