An Introduction To Maximum Principles And Symmetry

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An Introduction To Maximum Principles And Symmetry *2021-02-14*

MARQUEZ ASHLEY

An Introduction to Nonlinear Partial Differential Equations Cambridge University Press
This book provides the reader with a gentle path through the multifaceted theory of vector fields, starting from the definitions and the basic properties of vector fields and flows, and ending with some of their countless applications, in the framework of what is nowadays called Geometrical Analysis. Once the background material is established, the applications mainly deal with the following meaningful settings: ODE theory; Maximum Principles (weak, strong and propagation principles); Lie groups (with an emphasis on the construction of Lie groups). This book also provides an introduction to the basic theory of Geometrical Analysis, with a new foundational presentation based on Ordinary Differential Equation techniques, in a unitary and self-contained way.
Income, Wealth, and the Maximum Principle Academic Press
This book provides the reader with a gentle path through the multifaceted theory of vector fields, starting from the definitions and the basic properties of vector fields and flows, and ending with some of their countless applications, in the framework of what is nowadays called Geometrical Analysis. Once the background material is established, the applications mainly deal with the following meaningful settings:
Maximum Principles and Geometric Applications Firewall Media
Unabridged republication is a resource for topics in elliptic equations and systems and free boundary problems.
Computer Literature Bibliography: 1964-1967 Courier Corporation
A complete introduction to partial differential equations, this textbook provides a rigorous yet accessible guide to students in mathematics, physics and engineering. The presentation is lively and up to date, paying particular emphasis to developing an appreciation of underlying mathematical theory. Beginning with basic definitions, properties and derivations of some basic equations of mathematical physics from basic principles, the book studies first order equations, classification of second order equations, and the one-dimensional wave equation. Two chapters are devoted to the separation of variables, whilst others concentrate on a wide range of topics including elliptic theory, Green's functions, variational and numerical methods. A rich collection of worked examples and exercises accompany the text, along with a large number of illustrations and graphs to provide insight into the numerical examples. Solutions to selected exercises are included for students whilst extended solution sets are available to lecturers from solutions@cambridge.org.
Stochastic Differential Equations Springer
This compact and original exposition of optimal control theory and applications is designed for graduate and advanced undergraduate students in economics. It presents a new elementary yet rigorous proof of the maximum principle and a new way of applying the principle that will enable students to solve any one-dimensional problem routinely. Its unified framework illuminates many famous economic examples and models. This work also emphasizes the connection between optimal control theory and the classical themes of capital theory. It offers a fresh approach to fundamental questions such as: What is income? How should it be measured? What is its relation to wealth? The book will be valuable to students who want to formulate and solve dynamic allocation problems. It will also be of interest to any economist who wants to understand results of the latest research on the relationship between comprehensive income accounting and wealth or welfare. Table of Contents: Preface Introduction Part I. Introduction to the Maximum Principle 1. The Calculus of Variations and the Stationary Rate of Return on Capital 2. The Prototype-Economic Control Problem 3. The Maximum Principle in One Dimension 4. Applications of the Maximum Principle in One Dimension Part II. Comprehensive Accounting and the Maximum Principle 5. Optimal Multisector Growth and Dynamic Competitive Equilibrium 6. The Pure Theory of Perfectly Complete National Income Accounting 7. The Stochastic Wealth and Income Version of the Maximum Principle References Index
An Introduction To The Geometrical Analysis Of Vector Fields: With Applications To Maximum Principles And Lie Groups Springer Science & Business Media
Partial differential equations are fundamental to the modeling of natural phenomena. The desire to understand the solutions of these equations has always had a prominent place in the efforts of mathematicians and has inspired such diverse fields as complex function theory, functional analysis, and algebraic topology. This book, meant for a beginning graduate audience, provides a thorough introduction to partial differential equations.
The Classical Calculus of Variations in Optimum Control Problems : an Introduction to the Maximum Principle of Pontryagin World Scientific
Maximum principles are bedrock results in the theory of second order elliptic equations. This principle, simple enough in essence, lends itself to a quite remarkable number of subtle uses when combined appropriately with other notions. Intended for a wide audience, the book provides a clear and comprehensive explanation of the various maximum principles available in elliptic theory, from their beginning for linear equations to recent work on nonlinear and singular equations.
The Maximum Principle Springer
Advanced text, originally published in 2000, on differential equations, with plentiful supply of exercises all with detailed hints.
The Generalized Maximum Principle Oxford University Press
This monograph is an introduction to optimal control theory for systems governed by vector ordinary differential equations. It is not intended as a state-of-the-art handbook for researchers. We have tried to keep two types of reader in mind: (1) mathematicians, graduate students, and advanced undergraduates in mathematics who want a concise introduction to a field which contains nontrivial interesting applications of mathematics (for example, weak convergence, convexity, and the theory of ordinary differential equations); (2) economists, applied scientists, and engineers who want to understand some of the mathematical foundations. of optimal control theory. In general, we have emphasized motivation and explanation, avoiding the "definition-axiom-theorem-proof" approach. We make use of a large number of examples, especially one simple canonical example which we carry through the entire book. In proving theorems, we often just prove the simplest case, then state the more general results which can be proved. Many of the more difficult topics are discussed in the "Notes" sections at the end of chapters and several major proofs are in the Appendices. We feel that a solid understanding of basic facts is best attained by at first avoiding excessive generality. We have not tried to give an exhaustive list of references, preferring to refer the reader to existing books or papers with extensive bibliographies. References are given by author's name and the year of publication, e.g., Waltman [1974].
Partial Differential Equations: An Introduction, 2nd Edition Springer Science & Business Media
In 1932 Norbert Wiener gave a series of lectures on Fourier analysis at the Univer sity of Cambridge. One result of Wiener's visit to Cambridge was his well-known text The Fourier Integral and Certain of its Applications; another was a paper by G. H. Hardy in the 1933 Journalofthe London Mathematical Society. As Hardy says in the introduction to this paper, This note originates from a remark of Prof. N. Wiener, to the effect that "a f and g [= j] cannot both be very small". ... The theo pair of transforms rems which follow give the most precise interpretation possible ofWiener's remark. Hardy's own statement of his results, lightly paraphrased, is as follows, in which f is an integrable function on the real line and f is its Fourier transform: x 2 m If f and j are both 0 (Ix1e- /2) for large x and some m, then each is a finite linear combination ofHermite functions. In particular, if f and j are x2 x 2 2 2 both O(e- /), then f = j = Ae- / , where A is a constant; and if one x 2 2 is0(e- /), then both are null.
Nonoscillation Theory of Functional Differential Equations with Applications Springer Science & Business Media
Maximum Principles for the Hill's Equation focuses on the application of these methods to nonlinear equations with singularities (e.g. Brillouin-bem focusing equation, Ermakov-Pinney,...) and for problems with parametric dependence. The authors discuss the properties of the related Green's functions coupled with different boundary value conditions. In addition, they establish the equations' relationship with the spectral theory developed for the homogeneous case, and discuss stability and constant sign solutions. Finally, reviews of present classical and recent results made by the authors and by other key authors are included. Evaluates classical topics in the Hill's equation that are crucial for understanding modern physical models and non-linear applications Describes explicit and effective conditions on maximum and anti-maximum principles Collates information from disparate sources in one self-contained volume, with extensive referencing throughout
An Introduction to the Geometrical Analysis of Vector Fields Cambridge University Press
This monograph explores nonoscillation and existence of positive solutions for functional differential equations and describes their applications to maximum principles, boundary value problems and stability of these equations. In view of this objective the volume considers a wide class of equations including, scalar equations and systems of different types, equations with variable types of delays and equations with variable deviations of the argument. Each chapter includes an introduction and preliminaries, thus making it complete. Appendices at the end of the book cover reference material. Nonoscillation Theory of Functional Differential Equations with Applications is addressed to a wide audience of researchers in mathematics and practitioners.
Research Report Birkhäuser
Systems that evolve with time occur frequently in nature and modelling the behavior of such systems provides an important application of mathematics. These systems can be completely deterministic, but it may be possible too to control their behavior by intervention through "controls". The theory of optimal control is concerned with determining such controls which, at minimum cost, either direct the system along a given trajectory or enable it to reach a given point in its state space. This textbook is a straightforward introduction to the theory of optimal control with an emphasis on presenting many different applications. Professor Hocking has taken pains to ensure that the theory is developed to display the main themes of the arguments but without using sophisticated mathematical tools. Problems in this setting can arise across a wide range of subjects and there are illustrative examples of systems from fields as diverse as dynamics, economics, population control, and medicine. Throughout there are many worked examples, and numerous exercises (with solutions) are provided.
Partial Differential Equations Springer Science & Business Media
Covering some of the key areas of optimal control theory (OCT), a rapidly expanding field, the authors use new methods to set out a version of OCT's more refined 'maximum principle.' The results obtained have applications in production planning, reinsurance-dividend management, multi-model sliding mode control, and multi-model differential games. This book explores material that will be of great interest to post-graduate students, researchers, and practitioners in applied mathematics and engineering, particularly in the area of systems and control.
Introduction to Variational Methods in Control Engineering Cambridge University Press
Geared toward advanced undergraduate and graduate engineering students, this text introduces the theory and applications of optimal control. It serves as a bridge to the technical literature, enabling students to evaluate the implications of theoretical control work, and to judge the merits of papers on the subject. Rather than presenting an exhaustive treatise, Optimal Control offers a detailed introduction that fosters careful thinking and disciplined intuition. It develops the basic mathematical background, with a coherent formulation of the control problem and discussions of the necessary conditions for optimality based on the maximum principle of Pontryagin. In-depth examinations cover applications of the theory to minimum time, minimum fuel, and to quadratic criteria problems. The structure, properties, and engineering realizations of several optimal feedback control systems also receive attention. Special features include numerous specific problems, carried through to engineering realization in block diagram form. The text treats almost all current examples of control problems that permit analytic solutions, and its unified approach makes frequent use of geometric ideas to encourage students' intuition.
Order Structure and Topological Methods in Nonlinear Partial Differential Equations Princeton University Press
Partial differential equations are fundamental to the modeling of natural phenomena. The desire to understand the solutions of these equations has always had a prominent place in the efforts of mathematicians and has inspired such diverse fields as complex function theory, functional analysis, and algebraic topology. This book, meant for a beginning graduate audience, provides a thorough introduction to partial differential equations.
Maximum Principles for the Hill's Equation Academic Press
This book aims to give a user friendly tutorial of an interdisciplinary research topic (fronts or interfaces in random media) to senior undergraduates and beginning grad uate students with basic knowledge of partial differential equations (PDE) and prob ability. The approach taken is semiformal, using elementary methods to introduce ideas and motivate results as much as possible, then outlining how to pursue rigor ous theorems, with details to be found in the references section. Since

the topic concerns both differential equations and probability, and proba bility is traditionally a quite technical subject with a heavy measure theoretic com ponent, the book strives to develop a simplistic approach so that students can grasp the essentials of fronts and random media and their applications in a self contained tutorial. The book introduces three fundamental PDEs (the Burgers equation, Hamilton– Jacobi equations, and reaction–diffusion equations), analysis of their formulas and front solutions, and related stochastic processes. It builds up tools gradually, so that students are brought to the frontiers of research at a steady pace. A moderate number of exercises are provided to consolidate the concepts and ideas. The main methods are representation formulas of solutions, Laplace meth ods, homogenization, ergodic theory, central limit theorems, large deviation princi ples, variational principles, maximum principles, and Harnack inequalities, among others. These methods are normally covered in separate books on either differential equations or probability. It is my hope that this tutorial will help to illustrate how to combine these tools in solving concrete problems.

An Introduction to the Uncertainty Principle Springer Science & Business Media

In this book we open our insights in the Theory of the Firm, obtained through the application of Optimal Control Theory, to a public of scholars and advanced students in economics and applied mathematics. We walk on the micro economic side of the street that is bordered by Theory of the Firm on one side and by Optimal Control Theory on the other, keeping the reader away from all the dead end roads we turned down during our 10 years lasting research. We focus attention on the expressiveness and variety of insights that are obtained through studying only simple models of the firm. In this book mathematics is our tool, insight in optimal corporate policy our goal. Therefore most of the mathematics and calculations is put into appendices and in the main text all attention is on modelling corporate behaviour and on analysing the results of the calculations. So, the main text focusses on micro economics, even more specific: on Theory of the Firm. In that way this book is contrasted from such famous text books in applied Optimal Control with a much broader portfolio of applications, like Feichtinger & Hartl (1986) or with a more rigorous introduction into theory, like Seierstad & Sydsaeter (1987).

An Introduction to Maximum Principles and Symmetry in Elliptic Problems Cambridge University Press

Praise for the First Edition: "This book is well conceived and well written. The author has succeeded in producing a text on nonlinear PDEs that is not only quite readable but also accessible to students from diverse backgrounds." —SIAM Review A practical introduction to nonlinear PDEs and their real-world applications Now in a Second Edition, this popular book on nonlinear partial differential equations (PDEs) contains expanded coverage on the central topics of applied mathematics in an elementary, highly readable format and is accessible to students and researchers in the field of pure and applied mathematics. This book provides a new focus on the increasing use of mathematical applications in the life sciences, while also addressing key topics such as linear PDEs, first-order nonlinear PDEs, classical and weak solutions, shocks, hyperbolic systems, nonlinear diffusion, and elliptic equations. Unlike comparable books that typically only use formal proofs and theory to demonstrate results, An Introduction to Nonlinear Partial Differential Equations, Second Edition takes a more practical approach to nonlinear PDEs by emphasizing how the results are used, why they are important, and how they are applied to real problems. The intertwining relationship between mathematics and physical phenomena is discovered using detailed examples of applications across various areas such as biology, combustion, traffic flow, heat transfer, fluid mechanics, quantum mechanics, and the chemical reactor theory. New features of the Second Edition also include: Additional intermediate-level exercises that facilitate the development of advanced problem-solving skills New applications in the biological sciences, including age-structure, pattern formation, and the propagation of diseases An expanded bibliography that facilitates further investigation into specialized topics With individual, self-contained chapters and a broad scope of coverage that offers instructors the flexibility to design courses to meet specific objectives, An Introduction to Nonlinear Partial Differential Equations, Second Edition is an ideal text for applied mathematics courses at the upper-undergraduate and graduate levels. It also serves as a valuable resource for researchers and professionals in the fields of mathematics, biology, engineering, and physics who would like to further their knowledge of PDEs.

The Robust Maximum Principle Springer Science & Business Media

This textbook offers a concise yet rigorous introduction to calculus of variations and optimal control theory, and is a self-contained resource for graduate students in engineering, applied mathematics, and related subjects. Designed specifically for a one-semester course, the book begins with calculus of variations, preparing the ground for optimal control. It then gives a complete proof of the maximum principle and covers key topics such as the Hamilton-Jacobi-Bellman theory of dynamic programming and linear-quadratic optimal control. "Calculus of Variations and Optimal Control Theory" also traces the historical development of the subject and features numerous exercises, notes and references at the end of each chapter, and suggestions for further study. Offers a concise yet rigorous introduction Requires limited background in control theory or advanced mathematics Provides a complete proof of the maximum principle Uses consistent notation in the exposition of classical and modern topics Traces the historical development of the subject Solutions manual (available only to teachers) Leading universities that have adopted this book include: University of Illinois at Urbana-Champaign ECE 553: Optimum Control Systems Georgia Institute of Technology ECE 6553: Optimal Control and Optimization University of Pennsylvania ESE 680: Optimal Control Theory University of Notre Dame EE 60565: Optimal Control