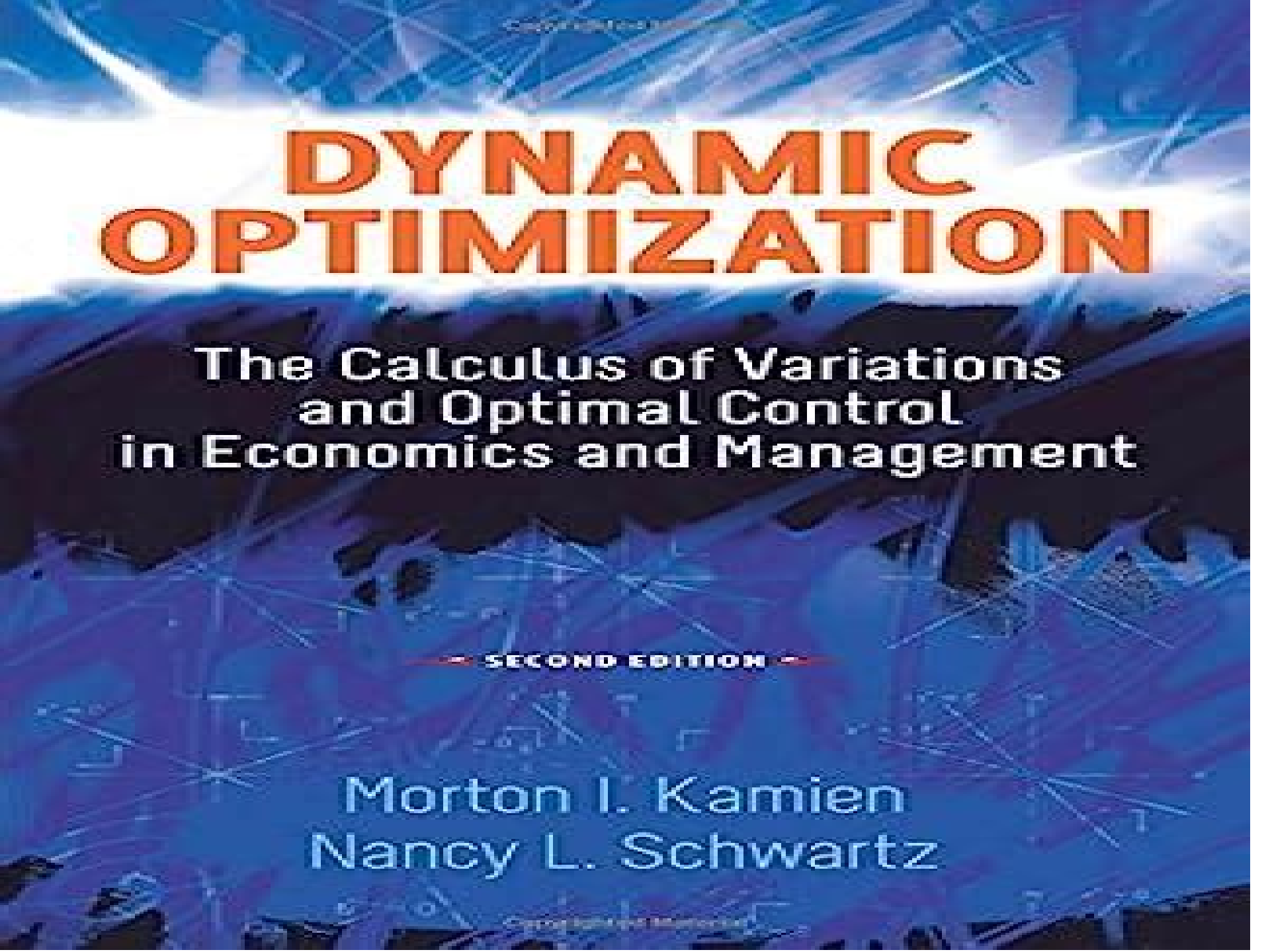
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The Calculus of Variations and Optimal Control in Economics and Management
SECOND EDITION
Morton I. Kamien
Nancy L. Schwartz

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this text presents an in depth exploration of dynamic optimization in economics **Introductory Optimization Dynamics** Pierre N.V. Tu,1991-11-04 This book presents the Calculus of Variations and Optimal Control Theory illustrating the analysis with examples from Economics and Management Science Topics are treated in the simplest possible way Students are takenfrom scratch to a fairly good mastery of these dynamic optimisation tools for the purpose of reading the literature and doing research requiring these tools The most important features of the book are the simplicity and thoroughness of presentation Students working at the book systematically will acquire a fairly good knowledge of the field and knowing how results have been derived they would be in a position to apply modify and even extend these standard results to the problems under investigation The new edition has two new chapters Chapter 11 on Differential Games which would be useful for students working in Industrial Organisation and Chapter 12 on Stability of Optimal Control which contains new results

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Constrained Optimization In The Calculus Of Variations and Optimal Control Theory J Gregory,2018-01-18 The major purpose of this book is to present the theoretical ideas and the analytical and numerical methods to enable the reader to understand and efficiently solve these important optimizational problems The first half of this book should serve as the major component of a classical one or two semester course in the calculus of variations and optimal control theory The second half of the book will describe the current research of the authors which is directed to solving these problems numerically In particular we present new reformulations of constrained problems which leads to unconstrained problems in the calculus of variations and new general accurate and efficient numerical methods to solve the reformulated problems We believe that these new methods will allow the reader to solve important problems Calculus of Variations and Optimal Control Theory

Daniel Liberzon,2012-01-08 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 **The Calculus of Variations and Optimal Control** George Leitmann,2013-06-29 When the Tyrian princess Dido landed on the North African shore of the Mediterranean sea she was welcomed by a local chieftain He offered her all the land that she could enclose between the shoreline and a rope of knotted cowhide While the legend does not tell us we may assume that Princess Dido arrived at the correct solution by stretching the rope into the shape of a circular arc and thereby maximized the area of the land upon which she was to found Carthage This story of the founding of Carthage is apocryphal Nonetheless it is probably the first account of a problem of the kind that inspired an entire mathematical discipline the calculus of variations and its extensions such as the theory of optimal control This book is intended to present an introductory treatment of the calculus of variations in Part I and of optimal control theory in Part II The discussion in Part I is restricted to the simplest problem of the calculus of variations The topic is entirely classical all of the basic theory had been developed before the turn of the century Consequently the material comes from many sources however those most useful to me have been the books of Oskar Bolza and of George M Ewing Part II is devoted to the elementary aspects of the modern extension of the calculus of variations the theory of optimal control of dynamical systems **A Primer on the Calculus of Variations and Optimal Control Theory** Mike Mesterton-Gibbons,2009 The calculus of variations is used to find functions that optimize quantities expressed in terms of integrals Optimal control theory seeks to find functions that minimize cost integrals for systems described by differential equations This book is an introduction to both the classical theory of the calculus of variations and the more modern developments of optimal control theory from the perspective of an applied mathematician It focuses on understanding concepts and how to apply them The range of potential applications is broad the calculus of variations and optimal control theory have been widely used in numerous ways in biology criminology economics engineering finance management science

and physics Applications described in this book include cancer chemotherapy navigational control and renewable resource harvesting The prerequisites for the book are modest the standard calculus sequence a first course on ordinary differential equations and some facility with the use of mathematical software It is suitable for an undergraduate or beginning graduate course or for self study It provides excellent preparation for more advanced books and courses on the calculus of variations and optimal control theory Variational Calculus and Optimal Control John L. Troutman,2012-12-06 Although the calculus of variations has ancient origins in questions of Ar istotle and Zenodoros its mathematical principles first emerged in the post calculus investigations of Newton the Bernoullis Euler and Lagrange Its results now supply fundamental tools of exploration to both mathematicians and those in the applied sciences Indeed the macroscopic statements ob tained through variational principles may provide the only valid mathemati cal formulations of many physical laws Because of its classical origins variational calculus retains the spirit of natural philosophy common to most mathematical investigations prior to this century The original applications including the Bernoulli problem of finding the brachistochrone require opti mizing maximizing or minimizing the mass force time or energy of some physical system under various constraints The solutions to these problems satisfy related differential equations discovered by Euler and Lagrange and the variational principles of mechanics especially that of Hamilton from the last century show the importance of also considering solutions that just provide stationary behavior for some measure of performance of the system However many recent applications do involve optimization in particular those concerned with problems in optimal control Optimal control is the rapidly expanding field developed during the last half century to analyze optimal behavior of a constrained process that evolves in time according to prescribed laws Its applications now embrace a variety of new disciplines including economics and production planning **Lectures on the Calculus of Variations and Optimal Control Theory** L. C. Young,2024-10-30 This book is divided into two parts The first addresses the simpler variational problems in parametric and nonparametric form The second covers extensions to optimal control theory The author opens with the study of three classical problems whose solutions led to the theory of calculus of variations They are the problem of geodesics the brachistochrone and the minimal surface of revolution He gives a detailed discussion of the Hamilton Jacobi theory both in the parametric and nonparametric forms This leads to the development of sufficiency theories describing properties of minimizing extremal arcs Next the author addresses existence theorems He first develops Hilbert s basic existence theorem for parametric problems and studies some of its consequences Finally he develops the theory of generalized curves and automatic existence theorems In the second part of the book the author discusses optimal control problems He notes that originally these problems were formulated as problems of Lagrange and Mayer in terms of differential constraints In the control formulation these constraints are expressed in a more convenient form in terms of control functions After pointing out the new phenomenon that may arise namely the lack of controllability the author develops the maximum principle and illustrates this principle by standard examples that show the switching phenomena that

may occur He extends the theory of geodesic coverings to optimal control problems Finally he extends the problem to generalized optimal control problems and obtains the corresponding existence theorems **Methods of Dynamic and Nonsmooth Optimization** Frank H. Clarke,1989-01-01 Presents the elements of a unified approach to optimization based on nonsmooth analysis a term introduced in the 1970 s by the author who is a pioneer in the field Based on a series of lectures given at a conference at Emory University in 1986 this volume presents its subjects in a self contained and accessible manner The topics treated here have been in an active state of development Focuses mainly on deterministic optimal control the calculus of variations and mathematical programming In addition it features a tutorial in nonsmooth analysis and geometry and demonstrates that the method of value function analysis via proximal normals is a powerful tool in the study of necessary conditions sufficient conditions controllability and sensitivity analysis The distinction between inductive and deductive methods the use of Hamiltonians the verification technique and penalization are also emphasized

Calculus of Variations and Optimal Control/Differential Equations Set Alexander Ioffe,Simeon Reich,I Shafrir,1999-07-16 The calculus of variations is a classical area of mathematical analysis yet its myriad applications in science and technology continue to keep it an active area of research Encompassing two volumes this set brings together leading experts who focus on critical point theory differential equations and the variational aspects of optimal control The books cover monotonicity nonlinear optimization the impossible pilot wave the Lavrentiev phenomenon and elliptic problems

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