

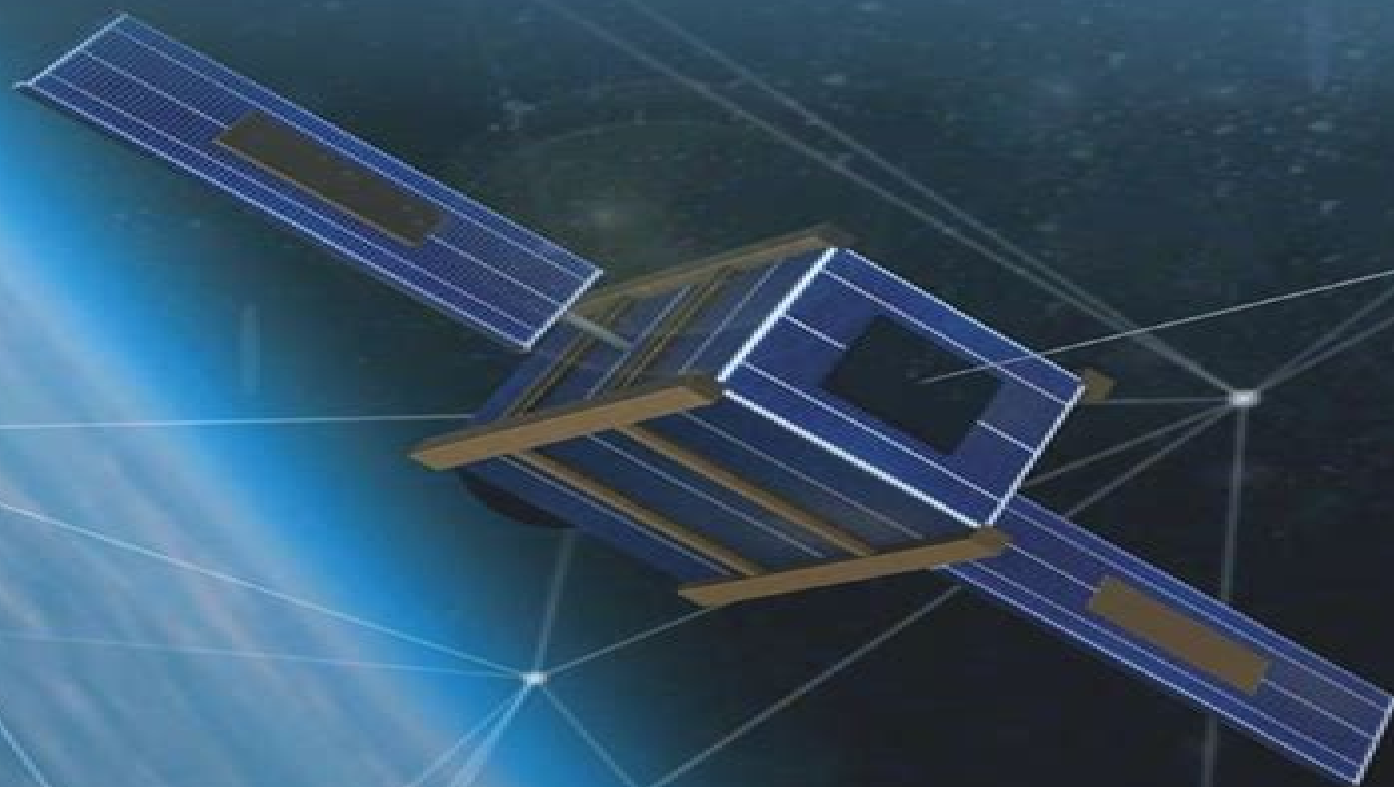
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OPTIMAL CONTROL

FROM VARIATIONS TO NANOSATELLITES



Optimal Control

Suresh P. Sethi, Gerald L. Thompson



Optimal Control:

Primer on Optimal Control Theory Jason L. Speyer, David H. Jacobson, 2010-05-13 A rigorous introduction to optimal control theory which will enable engineers and scientists to put the theory into practice Optimal Control Theory Donald E. Kirk, 2004-01-01 Geared toward upper level undergraduates this text introduces three aspects of optimal control theory dynamic programming Pontryagin's minimum principle and numerical techniques for trajectory optimization Numerous problems which introduce additional topics and illustrate basic concepts appear throughout the text Solution guide available upon request 131 figures 14 tables 1970 edition *Optimal Control* Leslie M. Hocking, 1991 Systems that evolve with time occur frequently in nature and modelling the behaviour of such systems provides an important application of mathematics These systems can be completely deterministic but it may be possible too to control their behaviour 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 as diverse fields as dynamics economics population control and medicine Throughout there are many worked examples and numerous exercises with solutions are provided **Optimal Control Theory** Suresh P. Sethi, 2018-11-28 This fully revised 3rd edition offers an introduction to optimal control theory and its diverse applications in management science and economics It brings to students the concept of the maximum principle in continuous as well as discrete time by using dynamic programming and Kuhn Tucker theory While some mathematical background is needed the emphasis of the book is not on mathematical rigor but on modeling realistic situations faced in business and economics The book exploits optimal control theory to the functional areas of management including finance production and marketing and to economics of growth and of natural resources In addition this new edition features materials on stochastic Nash and Stackelberg differential games and an adverse selection model in the principal agent framework The book provides exercises for each chapter and answers to selected exercises to help deepen the understanding of the material presented Also included are appendices comprised of supplementary material on the solution of differential equations the calculus of variations and its relationships to the maximum principle and special topics including the Kalman filter certainty equivalence singular control a global saddle point theorem Sethi Skiba points and distributed parameter systems Optimal control methods are used to determine optimal ways to control a dynamic system The theoretical work in this field serves as a foundation for the book which the author has applied to business management problems developed from his research and classroom instruction The new edition has been completely refined and brought up to date Ultimately this should continue to be a valuable

resource for graduate courses on applied optimal control theory but also for financial and industrial engineers economists and operational researchers concerned with the application of dynamic optimization in their fields Optimal Control and the Calculus of Variations Enid R. Pinch,1995 A paperback edition of this successful textbook for final year undergraduate mathematicians and control engineering students this book contains exercises and many worked examples with complete solutions and hints making it ideal not only as a class textbook but also for individual study The introduction to optimal control begins by considering the problem of minimizing a function of many variables before moving on to the main subject the optimal control of systems governed by ordinary differential equations Optimal Control Michael Athans,Peter L. Falb,2013-04-26 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 Optimal Control Theory Suresh P. Sethi,Gerald L. Thompson,2005-09-06 Optimal control methods are used to determine optimal ways to control a dynamic system The theoretical work in this field serves as a foundation for the book which the authors have applied to business management problems developed from their research and classroom instruction Sethi and Thompson have provided management science and economics communities with a thoroughly revised edition of their classic text on Optimal Control Theory The new edition has been completely refined with careful attention to the text and graphic material presentation Chapters cover a range of topics including finance production and inventory problems marketing problems machine maintenance and replacement problems of optimal consumption of natural resources and applications of control theory to economics The book contains new results that were not available when the first edition was published as well as an expansion of the material on stochastic optimal control theory Introduction to Optimal Control Theory Jack Macki,Aaron Strauss,2012-12-06 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 **Optimal Control** Leonid T. Aschepkov, Dmitriy V. Dolgy, Taekyun Kim, Ravi P. Agarwal, 2017-01-11 This book is based on lectures from a one year course at the Far Eastern Federal University Vladivostok Russia as well as on workshops on optimal control offered to students at various mathematical departments at the university level The main themes of the theory of linear and nonlinear systems are considered including the basic problem of establishing the necessary and sufficient conditions of optimal processes In the first part of the course the theory of linear control systems is constructed on the basis of the separation theorem and the concept of a reachability set The authors prove the closure of a reachability set in the class of piecewise continuous controls and the problems of controllability observability identification performance and terminal control are also considered The second part of the course is devoted to nonlinear control systems Using the method of variations and the Lagrange multipliers rule of nonlinear problems the authors prove the Pontryagin maximum principle for problems with mobile ends of trajectories Further exercises and a large number of additional tasks are provided for use as practical training in order for the reader to consolidate the theoretical material Optimal Control by Mathematical Programming Daniel Tabak, Benjamin C. Kuo, 1971

Optimal Control Bulirsch, Miele, Stoer, Well, 2013-03-08 Optimal Control reports on new theoretical and practical advances essential for analysing and synthesizing optimal controls of dynamical systems governed by partial and ordinary differential equations New necessary and sufficient conditions for optimality are given Recent advances in numerical methods are discussed These have been achieved through new techniques for solving large sized nonlinear programs with sparse Hessians and through a combination of direct and indirect methods for solving the multipoint boundary value problem The book also focuses on the construction of feedback controls for nonlinear systems and highlights advances in the theory of problems with uncertainty Decomposition methods of nonlinear systems and new techniques for constructing feedback controls for state and control constrained linear quadratic systems are presented The book offers solutions to many complex practical optimal control problems Nonlinear and Optimal Control Systems Thomas L. Vincent, Walter J. Grantham, 1997-06-23 Designed for one semester introductory senior or graduate level course the authors provide the

student with an introduction of analysis techniques used in the design of nonlinear and optimal feedback control systems. There is special emphasis on the fundamental topics of stability, controllability, and optimality, and on the corresponding geometry associated with these topics. Each chapter contains several examples and a variety of exercises.

Introduction to Control Theory, Including Optimal Control David N. Burghes, Alexander Graham, 1980

Applied Optimal Control A. E. Bryson, 2018-05-04. This best-selling text focuses on the analysis and design of complicated dynamics systems. CHOICE called it a high-level, concise book that could well be used as a reference by engineers, applied mathematicians, and undergraduates. The format is good, the presentation clear, the diagrams instructive, the examples and problems helpful. References and a multiple-choice examination are included.

An Introduction to Optimal Control Theory Aaron Strauss, 2012-12-06. This paper is intended for the beginner. It is not a state-of-the-art paper for research workers in the field of control theory. Its purpose is to introduce the reader to some of the problems and results in control theory to illustrate the application of these results and to provide a guide for his further reading on this subject. I have tried to motivate the results with examples, especially with one canonical simple example described in §3. Many results, such as the maximum principle, have long and difficult proofs. I have omitted these proofs. In general, I have included only the proofs which are either 1) not too difficult or 2) fairly enlightening as to the nature of the result. I have, however, usually attempted to draw the strongest conclusion from a given proof. For example, many existing proofs in control theory for compact targets and uniqueness of solutions also hold for closed targets and non-uniqueness. Finally, at the end of each section, I have given references to generalizations and origins of the results discussed in that section. I make no claim of completeness in the references, however, as I have often been content merely to refer the reader either to an exposition or to a paper which has an extensive bibliography.

IV. These lecture notes are revisions of notes I used for a series of nine lectures on control theory at the International Summer School on Mathematical Systems and Economics held in Varenna, Italy, June 1967.

Nonlinear Optimal Control Theory Leonard David Berkovitz, Negash G. Medhin, 2012-08-25. Nonlinear Optimal Control Theory presents a deep, wide-ranging introduction to the mathematical theory of the optimal control of processes governed by ordinary differential equations and certain types of differential equations with memory. Many examples illustrate the mathematical issues that need to be addressed when using optimal control techniques in diverse areas. Drawing on classroom-tested material from Purdue University and North Carolina State University, the book gives a unified account of bounded state problems governed by ordinary integrodifferential and delay systems. It also discusses Hamilton-Jacobi theory. By providing a sufficient and rigorous treatment of finite-dimensional control problems, the book equips readers with the foundation to deal with other types of control problems, such as those governed by stochastic differential equations, partial differential equations, and differential games.

Optimal Control Theory L.D. Berkovitz, 2013-03-14. This book is an introduction to the mathematical theory of optimal control of processes governed by ordinary differential equations. It is intended for students and

professionals in mathematics and in areas of application who want a broad yet relatively deep concise and coherent introduction to the subject and to its relationship with applications In order to accommodate a range of mathematical interests and backgrounds among readers the material is arranged so that the more advanced mathematical sections can be omitted without loss of continuity For readers primarily interested in applications a recommended minimum course consists of Chapter I the sections of Chapters II III and IV so recommended in the introductory sections of those chapters and all of Chapter V The introductory section of each chapter should further guide the individual reader toward material that is of interest to him A reader who has had a good course in advanced calculus should be able to understand the definitions and statements of the theorems and should be able to follow a substantial portion of the mathematical development The entire book can be read by someone familiar with the basic aspects of Lebesgue integration and functional analysis For the reader who wishes to find out more about applications we recommend references 2 13 33 35 and 50 of the Bibliography at the end of the book

Optimal Control Richard Vinter, 2010-06-25 Each chapter contains a well written introduction and notes They include the author's deep insights on the subject matter and provide historical comments and guidance to related literature This book may well become an important milestone in the literature of optimal control Mathematical Reviews Thanks to a great effort to be self contained this book renders accessibly the subject to a wide audience Therefore it is recommended to all researchers and professionals interested in Optimal Control and its engineering and economic applications It can serve as an excellent textbook for graduate courses in Optimal Control with special emphasis on Nonsmooth Analysis Automatica The book may be an essential resource for potential readers experts in control and optimization as well as postgraduates and applied mathematicians and it will be valued for its accessibility and clear exposition Applications of Mathematics

Optimal Control Theory Robert Pallu de La Barrière, 1967 **Optimal Control** Frank L. Lewis, Dragana Vrabie, Vassilis L. Syrmos, 2012-03-20 A NEW EDITION OF THE CLASSIC TEXT ON OPTIMAL CONTROL THEORY As a superb introductory text and an indispensable reference this new edition of Optimal Control will serve the needs of both the professional engineer and the advanced student in mechanical electrical and aerospace engineering Its coverage encompasses all the fundamental topics as well as the major changes that have occurred in recent years An abundance of computer simulations using MATLAB and relevant Toolboxes is included to give the reader the actual experience of applying the theory to real world situations Major topics covered include Static Optimization Optimal Control of Discrete Time Systems Optimal Control of Continuous Time Systems The Tracking Problem and Other LQR Extensions Final Time Free and Constrained Input Control Dynamic Programming Optimal Control for Polynomial Systems Output Feedback and Structured Control Robustness and Multivariable Frequency Domain Techniques Differential Games Reinforcement Learning and Optimal Adaptive Control

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