Fritz Colonius

Optimal Periodic Control

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Larry D. Dewell

Optimal Periodic Control:

Optimal Periodic Control Fritz Colonius,2006-11-15 This research monograph deals with optimal periodic control problems for systems governed by ordinary and functional differential equations of retarded type Particular attention is given to the problem of local properness i e whether system performance can be improved by introducing periodic motions Using either Ekeland s Variational Principle or optimization theory in Banach spaces necessary optimality conditions are proved In particular complete proofs of second order conditions are included and the result is used for various versions of the optimal periodic control problem Furthermore a scenario for local properness related to Hopf bifurcation is drawn up giving hints as to where to look for optimal periodic solutions The book provides mathematically rigorous proofs for results which are potentially of importance in chemical engineering and aerospace engineering   Optimal Periodic Control ,1988 Annotation This research monograph deals with optimal periodic control problems for systems governed by ordinary and functional differential equations of retarded type Particular attention is given to the problem of local properness i e whether system performance can be improved by introducing periodic motions Using either Ekeland s Variational Principle or optimization theory in Banach spaces necessary optimality conditions are proved In particular complete proofs of second order conditions are included and the result is used for various versions of the optimal periodic control problem Furthermore a scenario for local properness related to Hopf bifurcation is drawn up giving hints as to where to look for optimal periodic solutions The book provides mathematically rigorous proofs for results which are potentially of importance in chemical engineering and aerospace engineering   *Optimal Periodic Control by Fritz Colonius* Fritz Colonius,1988   **Theory and Applications of Multivariable Optimal Periodic Control** Dinko Sinčić,1976   **Optimal Periodic Control Models and Their Economical Applications** Mu Han,1992   *Optimal periodic control and regulator theory based on the second variation* Qinghong Wang,1989   Optimal Periodic Control of Distributed Systems Harjit Punj,1972   **Optimal Periodic Output Feedback Control** Gregory L. Hyslop,1989   Optimal Periodic Control Theory Richard T. Evans,1980 Existing conditions for locally optimizing a periodic process with free period are corrected extended and clarified using the strong properties of the Hamiltonian structure of the Optimal Periodic Control OPC Problem and the relationships of the second variation that result from the problem s periodicity constraints A neighboring optimum feedback controller is determined which regulates all perturbations back to the locally minimizing periodic trajectory This periodic regulator extends many of the concepts of the time invariant regulator An illustrative problem is constructed to demonstrate the basic characteristics of this class of problem A relatively comprehensive numerical investigation is conducted identifying a multiplicity of extremal solutions which are shown to form one parameter families of solutions to the OPC Bifurcation points which define the critical periodic solutions common to intersecting families are computed Extremal solutions satisfying all first order conditions are tested for local sufficiency conditions by verifying the existence of the Ricatti variable over one full period The neighboring optimal

feedback control law for a locally minimizing solution is tested by demonstrating the limit cycle behavior that results from perturbations to the initial conditions in a closed loop application An asymptotic series expansion is derived for the illustrative problem using a perturbation technique An extremal solution in the form of a Fourier series is obtained that accurately predicts the optimal period the locally minimizing periodic solution and the associated values of the Hamiltonian and the cost of the principal family Abstract report documentation page   Optimal periodic control theory Richard Taylor Evans,FRANK J SEILER RESEARCH LAB UNITED STATES AIR FORCE ACADEMY CO.,United States Air Force Academy,Frank J. Seiler Research Laboratory. Directorate of Aerospace-Mechanics Sciences. Guidance and Control Division,United States. Air Force. Systems Command,1980 Existing conditions for locally optimizing a periodic process with free period are corrected extended and clarified using the strong properties of the Hamiltonian structure of the Optimal Periodic Control OPC Problem and the relationships of the second variation that result from the problem s periodicity constraints A neighboring optimum feedback controller is determined which regulates all perturbations back to the locally minimizing periodic trajectory This periodic regulator extends many of the concepts of the time invariant regulator An illustrative problem is constructed to demonstrate the basic characteristics of this class of problem A relatively comprehensive numerical investigation is conducted identifying a multiplicity of extremal solutions which are shown to form one parameter families of solutions to the OPC Bifurcation points which define the critical periodic solutions common to intersecting families are computed Extremal solutions satisfying all first order conditions are tested for local sufficiency conditions by verifying the existence of the Ricatti variable over one full period The neighboring optimal feedback control law for a locally minimizing solution is tested by demonstrating the limit cycle behavior that results from perturbations to the initial conditions in a closed loop application An asymptotic series expansion is derived for the illustrative problem using a perturbation technique An extremal solution in the form of a Fourier series is obtained that accurately predicts the optimal period the locally minimizing periodic solution and the associated values of the Hamiltonian and the cost of the principal family Abstract report documentation p   **A Note on Optimal Periodic Control and Nested Optimization Problems** Fritz Colonius,Lefschetz Center for Dynamical Systems,Brown University. Division of Applied Mathematics,1984
     Computation of Optimal Periodic Control for Chemical Processes Subbarao Varigonda,2000   **Systems, Models and Feedback: Theory and Applications** A. Isidori,Tarn,2013-03-09 It is a great honor and privilege to have this opportunity of celebrating the 65th birthday of Professor Antonio Ruberti by holding an International Conference on Systems Models and Feedback The conference and this volume which contains its proceedings is a tribute to Professor Ruberti in acknowledgement of his major contributions to System Theory at a time in which this area was emerging and consolidat ing as an independent discipline his role as a leader of the Italian academic community his activity in promoting and fostering close scientific relations between Italian and U S scholars in Systems and Control The format of this conference is inspired by

a series of seminars initi ated exactly twenty years ago under the direction of Professor Ruberti in Italy and Professor R R Mohler in the U S By bringing together many authoritative talents from both countries these seminars were instrumental in promoting the expansion of System Theory in new areas notably that of Nonlinear Control and were the key to successful scientific careers for many of the younger attendants   Extensions of Optimal Periodic Control and Regulation for Constrained Hypersonic Cruise Larry David Dewell,1996   **SIAM Journal on Control and Optimization** Society for Industrial and Applied Mathematics,2005   *Automatic Control 1990* Ü Jaaksoo,2014-05-23 This volume provides a general overview on the state of the art and future developments in automation and control The application of systems and control in all areas is covered from the social and cultural effects of control to control in mineral and metal processing This volume will be an invaluable source of information to all those interested in the areas of automation and control   *Computational Mathematics Driven by Industrial Problems* R. Burkard,P. Deuflhard,A. Jameson,J.-L. Lions,G. Strang,2007-05-06 These lecture notes by very authoritative scientists survey recent advances of mathematics driven by industrial application showing not only how mathematics is applied to industry but also how mathematics has drawn benefit from interaction with real word problems The famous David Report underlines that innovative high technology depends crucially for its development on innovation in mathematics The speakers include three recent presidents of ECMI one of ECCOMAS in Europe and the president of SIAM   **The Riccati Equation** Sergio Bittanti,Alan J. Laub,Jan C. Willems,2012-12-06 Conceived by Count Jacopo Francesco Riccati more than a quarter of a millennium ago the Riccati equation has been widely studied in the subsequent centuries Since its introduction in control theory in the sixties the matrix Riccati equation has known an impressive range of applications such as optimal control H optimization and robust stabilization stochastic realization synthesis of linear passive networks to name but a few This book consists of 11 chapters surveying the main concepts and results related to the matrix Riccati equation both in continuous and discrete time Theory applications and numerical algorithms are extensively presented in an expository way As a foreword the history and prehistory of the Riccati equation is concisely presented   *Journal of Dynamic Systems, Measurement, and Control* ,2001 Publishes theoretical and applied original papers in dynamic systems Theoretical papers present new theoretical developments and knowledge for controls of dynamical systems together with clear engineering motivation for the new theory Applied papers include modeling simulation and corroboration of theory with emphasis on demonstrated practicality   Fuel-optimal Periodic Control and Regulation in Constrained Hypersonic Flight Larry D. Dewell,1996

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