Optimal Control

F. Colonius

Optimal Periodic Control

1988. VI, 177 pages. (Lecture Notes in Mathematics, Volume 1313).
Soft cover DM 28,50. ISBN 3-540-19249-2

Contents: Introduction. - Optimization Theory. - Retarded Functional Differential Equations. - Strong Local Minima. - Weak Local Minima. - Local Relaxed Minima. - Tests for Local Properness. - A Scenario for Local Properness. - Optimal Periodic Control of Ordinary Differential Equations. - References.

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.

In preparation

C. K. Chui, G. Chen

Linear Systems and Optimal Control

1988. 4 figures. Approx. 120 pages. (Springer Series in Information Sciences, Volume 18). Hard cover DM 98,-. ISBN 3-540-18737-5

Contents: State-Space Descriptions. - State Transition Equations and Matrixes. - Controllability. - Observability and Dual Systems. - Time-Invariant Linear Systems. - Stability. - Optimal Control Problems and Variational Methods. - Dynamic Programming. - The Minimum-Time Optimal Control Problems. - Notes and References. - References. - Answers and Hints to Exercises. - Notation. - Subject Index.

This book offers a self-contained, elementary and yet rigorous treatment of linear system theory and optimal control theory. Fundamental topics within this area are considered, first in the continuous-time and then in the discrete-time setting. Both time-varying and time-invariant cases are investigated. The approach is quite standard but a number of new results are also included, as are some brief applications. It provides a firm basis for further study and should be useful to all those interested in the rapidly developing subjects of systems engineering, optimal control theory and signal processing.

tm 8668/5/1

Springer-Verlag Berlin
Heidelberg New York London
Paris Tokyo Hong Kong

Heidelberger Platz 3, D-1000 Berlin 33 · 175 Fifth Ave., New York, NY 10010, USA · 28, Lurke Street, Bedford MK40 3HU, England · 26, rue des Carmes, F-75005 Paris · 37-3, Hongo 3-chome, Bunkyo-ku, Tokyo 113, Japan · Citicorp Centre, Room 1603, 18 Whitfield Road, Causeway Bay, Hong Kong

Communications in Mathematical Physics

Responsible for Advertisements: E. Lückermann, M. Stresow, Heidelberger Platz 3, D-1000 Berlin 33
Telephone: (030) 8207-1, Telex 01-85411, FAX (0)30/821 4091

Springer-Verlag: Berlin Heidelberg New York Tokyo

Printers: Brühlsche Universitätsdruckerei, Giessen

Springer-Verlag GmbH Co KG, D-1000 Berlin 33