Optimal Control And System Theory In Dynamic Economic Analysis

Masanao Aoki

This book bridges optimal control theory and economics, discussing ordinary differential equations, optimal control, game theory, and mechanism design in one volume. Dynamic strategies seek to both anticipate and effect such change in a given system so as to accomplish objectives of an individual, a group of agents, or a social planner. This book offers an introduction to continuous-time systems and methods for solving dynamic optimization problems at three different levels: single-person decision making, games, and mechanism design. The theory is illustrated with examples from economics. Figure 1.1 provides an overview of the book’s hierarchical approach. A part of mathematics in which a study is made of ways of formalizing and solving problems of choosing the best way, in an a priori described sense, of realizing a controlled dynamical process. This dynamical process, as a rule, can be described using differential, integral, functional, and finite-difference equations (or other formalized evolution relations, possibly involving stochastic aspects), depending on input functions or parameters, called controls, and usually subject to constraints. The Optimal control of economic systems optimal control algorithms dynamic game Nash-game decentralized policy design. This is a preview of subscription content, log in to check access. Aoki M. (1976) "Optimal Control and System Theory in Dynamic Economic Analysis," North-Holland, Amsterdam. Basar T. (1986) "A Tutorial on Dynamic and Differential Games," in: T. Basar (ed.) "Dynamic Games and Applications in Economics," Springer Verlag, Berlin. Basar T. and G.J. Olsder (1982) "Dynamic Noncooperative Game Theory," Academic Press, London/New York. Bellman R.E. (1957) "Dynamic Programming," Princeton University Press, Princeton.
Topics studied comprise the following: differential equations, dynamic programming, optimal control theory and stochastic processes. Upon completion an individual will: have the ability to solve differential equations and systems of differential equations, have acquired the knowledge of the methods of the optimal control theory and dynamic programming and its applicability for solving problems in economics, have developed skills in working with the Brownian and Wiener stochastic processes. and have the idea how Ito's integral is applied. Teaching methods. An Introduction to Mathematical Optimal Control Theory Version 0.2. By Lawrence C. Evans Department of Mathematics University of California, Berkeley. Chapter 1: Introduction Chapter 2: Controllability, bang-bang principle Chapter 3: Linear time-optimal control Chapter 4: The Pontryagin Maximum Principle Chapter 5: Dynamic programming Chapter 6: Game theory Chapter 7: Introduction to stochastic control theory Appendix: Proofs of the Pontryagin Maximum Principle Exercises References. CONTROLLED DYNAMICS. We generalize a bit and suppose now that, $f$ depends also upon some control parameters belonging to a set $A \subset \mathbb{R}^m$; so that. New Trends in Dynamic System Theory and Economics contains selected papers presented at a two-week seminar on New Trends in Dynamic System Theory and Economics held at the International Center for Mechanical Sciences in Udine, Italy, on September 12-23, 1977. Contributors discuss recent trends in the application of dynamic system theory in economic analysis, paying particular attention to information patterns and uncertainty, optimal control theory and its application, and disequilibrium analysis. Necessary and Sufficient Conditions for Optimal Strategies in Impulsive Control and Applications. Optimal Control on an Infinite Time Horizon with Applications to a Class of Economic Systems. Optimal Periodic Maintenance of a Capital Good.