Systèmes, contrôle optimal

Biologie et sciences du comportement

J. MAZUMDAR. — **An introduction to mathematical physiology and biology.** — 2nd edition. — Cambridge studies in mathematical biology. — Un vol. broché, 15×23, de XIV, 226 p. — ISBN 0-521-64675-8. — Prix: £18.95. — Cambridge University Press, Cambridge, 1999.

This textbook is concerned with the mathematical modelling of biological and physiological phenomena for mathematically sophisticated students. A range of topics are discussed: diffusion, population dynamics, autonomous differential equations and the stability of ecosystems, biogeography, pharmokinetics, epidemiology, HIV immunology, biofluid mechanics, cardiac mechanics, the spectral analysis of heart sounds using FFT techniques. The last chapter deals with a wide variety of commonly used medical devices.

Systèmes, contrôle optimal

V. BOLTYANSKI, H. MARTINI, V. SOLTAN. — **Geometric methods and optimization problems.** — Combinatorial optimization, vol. 4. — Un vol. relié, 16,5×24,5, de VIII, 429 p. — ISBN 0-7923-5454-0. — Prix: Dfl. 340.00. — Kluwer Academic Publishers, Dordrecht, 1999.

The work focuses on three disciplines of applied mathematics: control theory, location science and computational geometry. The authors show how methods and tools from convex geometry in a wider sense can help solve various problems from these disciplines. More precisely they mainly consider the tent method (as an application of a generalized separation theory of convex cones) in nonclassical variational calculus, various median problems in Euclidean and other Minkowski spaces (including a detailed discussion of the Fermat-Torricelli problem) and different types of partitionings of topologically complicated polygonal domains into a minimum number of convex pieces.

Yves CHERRUAULT. — **Optimisation: méthodes locales et globales.** — Mathématiques. — Un vol. broché, 15×22, de 98 p. — ISBN 2-13-049910-4. — Prix: FF 148.00. — Presses Universitaires de France, Paris, 1999.

L'auteur a mis au point une technique d'optimisation globale, baptisée ALIENOR, qui permet de ramener la minimisation d'une fonction multivariables à celle d'une fonction d'une seule variable. Les derniers développements associés à ces méthodes sont décrits. Des classes très générales de transformations réductrices sont proposées et l'on montre comment les méthodes d'optimisation peuvent servir à la résolution d'équations fonctionnelles de tous types. Deux applications fondamentales de l'optimisation sont également traitées, à savoir: l'identification de modèles mathématiques, le contrôle optimal de systèmes. Cet ouvrage sera un précieux outil pour les chercheurs et ingénieurs utilisant les méthodes d'optimisation ainsi que pour les étudiants scientifiques désireux de s'initier à ces techniques.

Hector O. FATTORINI. — **Infinite dimensional optimization and control theory.** — Encyclopedia of mathematics and its applications, vol. 62. — Un vol. relié, 16×24, de XV, 793 p. — ISBN 0-521-45125-6. — Prix: £70.00. — Cambridge University Press, Cambridge, 1999.

This book is on existence and necessary conditions, such as Pontryagin's maximum principle, for optimal control problems described by ordinary and partial differential equations. These necessary conditions are obtained from Kuhn-Tucker theorems for nonlinear programming problems in infinite dimensional spaces. The optimal control problems include control constraints, state constraints and target conditions. Evolution partial differential equations are studied using

semigroup theory, abstract differential equations in linear spaces, integral equations and interpolation theory. Existence of optimal controls is established for arbitrary control sets by means of a general theory of relaxed controls.

Giorgio PICCI, David S. GILLIAM, (Editors). — **Dynamical systems, control, coding computer vision: new trends, interfaces, and interplay.** — Progress in systems and control theory, vol. 25. — Un vol. relié, 16×24, de VI, 493 p. — ISBN 3-7643-6060-7. — Prix: SFr. 168.00. — Birkhäuser, Basel, 1999.

This volume contains expanded versions of talks delivered by leading experts at the Mathematical Theory of Networks and Systems Symposium (MTNS 98) in Padova, Italy, in July 1998. Systems, control, and network theory have permeated the development of much of present-day technology. The theory has developed from the early phase of its history when the basic tools were elementary complex analysis, Laplace transform, and linear differential equations, to the present day, where the mathematics ranges widely from functional analysis, PDEs, abstract algebra, stochastic processes and differential geometry. This book is a collection of essays devoted in part to the growing interaction of these disciplines with coding, computer vision, and hybrid systems.

Martin SCHECHTER. — **Linking methods in critical point theory.** — Un vol. relié, 16,5×24,5, de XVI, 294 p. — ISBN 0-8176-4095-9. — Prix: SFr. 98.00. — Birkhäuser, Boston, 1999.

Many non-linear problems in the physical and social sciences can be reduced to finding critical points (minima, maxima, and minimax points) of functionals (real-valued functions on various spaces). Much of the activity in the calculus of variations is devoted to finding such points, although a more difficult problem is finding critical points that are neither maxima nor minima. Until recently there was no organized procedure for producing such points. In this work, Schechter briefly reviews the issue of critical points from the old "linking" viewpoint and then studies the theory in light of a new concept of "linking subsets" which he helped introduce. New theorems are proved and applied to the solution of subcritical problems on bounded domains.

Ian S. SHAW. — **Fuzzy control of industrial systems: theory and applications.** — Un vol. relié, 16,5×24,5, de XXIII, 192 p. — ISBN 0-7923-8249-8. — Prix: Dfl. 260.00. — Kluwer Academic Publishers, Dordrecht, 1998.

This volume has been planned as an introductory textbook on intelligent control systems such as fuzzy logic and neurofuzzy systems. The objective was to create a linkage between an undergraduate text and a practical guide for experienced engineers wishing to upgrade their knowledge. To this end, both theoretical as well as practical design aspects are presented. Included are generic aspects of fuzzy systems with an emphasis on the many degrees of freedom and its practical design implications, modeling and systems identification techniques based on fuzzy rules, parametrized rules and relational equations... etc.

Information, communication, circuits

Ian F. BLAKE, Gadiel SEROUSSI & Nigel P. SMART. — **Elliptic curves in cryptography.** — London Mathematical Society lecture note series, vol. 265. — Un vol. broché, 15×23, de XV, 204 p. — ISBN 0-521-65374-6. — Prix: £24.95. — Cambridge University Press, Cambridge, 1999.

In the past few years elliptic curve cryptography has moved from a fringe activity to a major challenger to the dominant RSA/DSA systems. Elliptic curves offer major advances on older