

Biologie et sciences du comportement

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Mécanique quantique

Rodolfo GAMBINI, Jorge PULLIN. — **Loops, knots, gauge theories and quantum gravity.** — Cambridge monographs on mathematical physics. — Un vol. broché, 17×25 , de xvi, 321 p. — ISBN 0-521-47332-2. — Prix: £27.95. — Cambridge University Press, Cambridge, 2000.

This text begins with a detailed review of loop representation theory. It then goes on to describe loop representations in Maxwell theory, Yang-Mills theories as well as lattice techniques. Applications in quantum gravity are then discussed in detail. Following chapters move on to consider knot theories, braid theories and extended loop representations in quantum gravity. A final chapter assesses the current status of the theory and points out possible directions for future research.

Masaki KASHIWARA, Tetsuji MIWA, (Editors). — **Physical combinatorics.** — Progress in mathematics, vol. 191. — Un vol. relié, $16,5 \times 24$, de viii, 317 p. — ISBN 0-8176-4175-0. — Prix: SFr. 128.00. — Birkhäuser, Boston, 2000.

This work is concerned with combinatorial aspects arising in the theory of exactly solvable models and representation theory. Recent developments in integrable models reveal an unexpected link between representation theory and statistical mechanics through combinatorics. For example, Young tableaux, which describe the basis of irreducible representations, appear in the Bethe Ansatz method in quantum spin chains as labels for the eigenstates of Hamiltonians. Taking into account the various criss-crossing among mathematical subjects, "Physical Combinatorics" presents new results and exciting ideas from three viewpoints: representation theory, integrable models, and combinatorics. This volume will be of interest to mathematical physicists and graduate students in the above-mentioned fields. Contributors to the volume: T. H. Baker, O. Foda, G. Hatayama, Y. Komori, A. Kuniba, T. Nakanishi, M. Okado, A. Schilling, J. Suzuki, T. Takagi, D. Uglov, O. Warnaar, T.A. Welsh, A. Zabrodin.

Economie, recherche opérationnelle, jeux

Jerzy A. FILAR, Vladimir GAITSGORY, Koichi MIZUKAMI, (Editors). — **Advances in dynamic games and applications.** — Annals of the International Society of Dynamical Games, vol. 5. — Un vol. relié, 16×24 , de xvii, 459 p. — ISBN 0-8176-4002-9 — Prix: SFr. 188.00. — Birkhäuser, Boston, 2000.

The book focuses on various aspects of dynamic-game theory, providing authoritative, state-of-the-art information and serving as a guide to the vitality of the field and its applications. The chapters are based on presentations at the 7th International Symposium on Dynamic Games and Applications held in Kanagawa, Japan. A variety of topics of current interest are presented. *Topics and features*: robust control design and H-infinity; pursuit-evasion games; recent game-theoretic developments; select applications in ecology and environmental science.

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Jacques ISTAS. — **Introduction aux modélisations mathématiques pour les sciences du vivant.** — Mathématiques & applications, vol. 34. — Un vol. broché, $15,5 \times 23,5$, de viii, 160 p. — ISBN 3-540-67254-0. — Prix: DM 60.00. — Springer, Paris, 2000.

Le but de cet ouvrage est de présenter un panorama de différentes méthodes mathématiques utilisées pour la modélisation de phénomènes issus du vivant. Nous avons voulu être le plus

large possible, incluant ainsi à la fois les méthodes déterministes (systèmes dynamiques, théorie des jeux) et les méthodes stochastiques (processus aléatoires, statistiques). Chaque modèle mathématique proposé est accompagné d'un exemple concret éclairant la modélisation retenue.

Systèmes, contrôle optimal

Fritz COLONIUS, Wolfgang KLIEMANN. — **The dynamics of control.** — With an appendix by Lars Grüne. — Systems & control. — Un vol. relié, 16×24, de XII, 629 p. — ISBN 0-8176-3683-8. — Prix : SFr. 158.00. — Birkhäuser, Boston, 2000.

The book provides a carefully integrated development of the mathematical connections between nonlinear control, dynamical systems and time-varying perturbed systems for scientists and engineers. The central theme is the notion of control flow with its global dynamics and linearization presented in detail. The book's scope is comprehensive and includes the global theory of dynamical systems under time-varying perturbations, global and local dynamics of control systems, connections between control systems and dynamical systems and the relevant numerical methods for global dynamics, linearization and stability. Topics are developed with a diverse and extensive selection of applied problems from control and dynamical systems.

Eugenius KASZKUREWICZ, Amit BHAYA. — **Matrix diagonal stability in systems and computation.** — Un vol. relié, 16×24, de XIV, 267 p. — ISBN 0-8176-4088-6. — Prix : SFr. 138.00. — Birkhäuser, Boston, 2000.

This book addresses the matrix-stability concept and its applications to the analysis and design of several types of dynamical systems, both discrete-time and continuous-time dynamical systems. The comprehensive presentation begins with an introductory chapter surveying applied examples from diverse fields, i.e., robust stability analysis, asynchronous iterative computation, neural networks and variable structure dynamical systems. The next few chapters develop the theory and include a unified presentation of results in the area of matrix-diagonal stability and D-stability. The remaining chapters examine the various applications in greater detail. Both classical and new results are discussed, and the overall treatment is self contained, only requiring a knowledge of linear algebra, difference equations, and differential equations.

William G. LITVINOV. — **Optimization in elliptic problems with applications to mechanics of deformable bodies and fluid mechanics.** — Operator theory, vol. 119. — Un vol. relié, de 16×24, de XVII, 522 p. — ISBN 3-7643-6199-9. — Prix : SFr. 198.00. — Birkhäuser, Basel, 2000.

This book is unique in that it presents a profound mathematical analysis of general optimization problems for elliptic systems, which are then applied to a great number of optimization problems in mechanics and technology. After the setting of a problem, attention is focused on existence theorems that lead to the construction of approximate solutions. The coefficients of the equations, the shape of the domain, and the right-hand sides of the equations are considered to be controls. Applications include optimization problems arising in mechanics of elastic solids, plates, shells, composite materials and structures fabricated with them, as well as fluid mechanics.

Alexey S. MATVEEV, Andrey V. SAVKIN. — **Qualitative theory of hybrid dynamical systems.** — Control engineering. — Un vol. relié, 16×24, de X, 348 p. — ISBN 0-8176-4141-6. — Prix : SFr. 128.00. — Birkhäuser, Boston, 2000.

This book provides a thorough development and systematic presentation of the foundations and framework for hybrid dynamical systems. The presentation offers an accessible, but precise,