

# Information, communication, circuits

Objektyp: **Chapter**

Zeitschrift: **L'Enseignement Mathématique**

Band (Jahr): **47 (2001)**

Heft 1-2: **L'ENSEIGNEMENT MATHÉMATIQUE**

PDF erstellt am: **12.07.2024**

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tic and stochastic, continuous- and discrete-time, linear-quadratic optimal control, and filtering problems... illustrates high-gain feedback and cheap control engineering problems, sampled data systems, and H optimization with helpful case studies... demonstrates theoretical results from examples in the aerospace, chemical, electrical, and automotive industries... simplifies hardware implementation of optimal controllers and filters... considers the eigenvector approach for the algebraic Riccati equations... identifies unsolved discrete-time domain and finite horizon optimization problems for future research... and more.

Harry G. KWATNY, Gilmer L. BLANKENSHIP. — **Nonlinear control and analytical mechanics: a computational approach.** — Control engineering. — Un vol. relié, 16,5 × 24, de xv, 317 p. + 1 CD-ROM. — ISBN 0-8176-4147-5. — Prix: SFr. 108.00. — Birkhäuser, Boston, 2000.

This book features an integrated treatment of nonlinear control and analytical mechanics and a set of symbolic computing software tools for modeling and control systems design. The integrated approach provides a rich set of models and control design examples that are of contemporary and practical interest to engineers. By simultaneously considering both mechanics and control, the engineer achieves a better appreciation of the underlying geometric ideas and constructions that are common to both. This book highlights and utilizes the computational infrastructure common to both modern analytical mechanics and nonlinear control. To achieve the full benefits of the concepts now available, symbolic, as well as numerical, computing techniques must be exploited.

Marcio S. DE QUEIROZ, Darren M. DAWSON, Siddharth P. NAGARKATTI, Fumin ZHANG. — **Lyapunov-based control of mechanical systems.** — Control engineering. — Un vol. relié, 16 × 24, de XIII, 316 p. — ISBN 0-8176-4086-X. — Prix: SFr. 128.00. — Birkhäuser, Boston, 2000.

This is a text/reference on advanced nonlinear controllers for mechanical systems that are based on Lyapunov-type design and stability analysis methodology. The presentation illustrates, in a unified framework, how recent Lyapunov-based techniques can be used to solve a variety of nonlinear control problems for mechanical systems. The foundations of the Lyapunov-based approach are established in a thorough manner, including necessary math background materials. In the first portion of the book, solutions are provided to some tracking problems for rigid mechanical systems, i.e., systems modeled by ordinary differential equations. The second portion addresses problems of setpoint/vibration control of flexible mechanical systems, i.e., systems modeled by partial differential equations. By covering theory and applications, the book addresses both ODE-based and PDE-based mechanical systems and presents results for many useful real-time experiments and computer simulations.

### *Information, communication, circuits*

D.R. HANKERSON, D.G. HOFFMAN, D.A. LEONARD, C.C. LINDNER, K.T. PHELPHS, C.A. RODGER, J.R. WALL. — **Coding theory and cryptography: the essentials.** — Second edition, revised and expanded. — Pure and applied mathematics, vol. 234. — Un vol. relié, 16 × 23,5, de x, 350 p. — ISBN 0-8247-0465-7. — Prix: US\$85.00. — Marcel Dekker, New York, 2000.

This highly successful textbook, proven by the authors in a popular two-quarter course, presents coding theory, construction, encoding, and decoding of specific code families in an “easy-to-use” manner appropriate for students with only a basic background in mathematics—offering revised and updated material on the Berlekamp-Massey decoding algorithm and convolutional

codes. The revised edition includes an extensive new section on cryptography, designed for an introductory course on the subject. Containing data on number theory, encryption schemes, and cyclic codes, the second edition of *Coding Theory and Cryptography: the Essentials* introduces the mathematics as it is needed; contains many exercises, with solutions; provides a concise and self-contained introduction to modern cryptography, with an emphasis on public-key methods; spends considerable time on two of the most applicable codes, Reed-Solomon and convolutional codes, that are used by NASA, ... and more!

Gareth A. JONES, J. Mary JONES. — **Information and coding theory.** — Springer undergraduate mathematics series. — Un vol. broché,  $17 \times 23,5$ , de XI, 210 p. — ISBN 1-85233-622-6. — Prix: DM 59.00. — Springer, London, 2000.

This book provides an elementary introduction to information theory and coding theory – two related aspects of the problem of how to transmit information efficiently and accurately. The first part of the book focuses on information theory, covering uniquely decodable and instantaneous codes, Huffman coding, entropy, information channels, and Shannon's fundamental theorem. In the second part, on coding theory, linear algebra is used to construct examples of such codes, such as the Hamming, Hadamard, Golay and Reed-Muller codes. The book emphasises carefully explained proofs and worked examples; exercises (with solutions) are integrated into the text as part of the learning process. Only some basic probability theory and linear algebra, together with a little calculus (as covered in most first-year university syllabuses), is assumed, making it suitable for second- and third-year undergraduates in mathematics, electronics and computer science.

Kwok-Yan LAM, Igor SHPARLINSKI, Huaxiong WANG, Chaoping XING, (Editors). — **Cryptography and computational number theory.** — Progress in computer science and applied logic, vol. 20. — Un vol. relié,  $16 \times 24$ , de VIII, 378 p. — ISBN 3-7643-6510-2. — Prix: SFr. 148.00. — Birkhäuser, Basel, 2001.

The rapid development of cryptography and computational number theory was the subject of the CCNT Workshop in Singapore in November 1999. The present volume comprises a selection of refereed papers originating from this event, presenting either a survey of some area, or original and new results. They concern many different aspects of the field such as theory, techniques, applications and practical experience. It provides a state-of-the-art report on some number theoretical issues of significance to cryptography.

Armen H. ZEMANIAN. — **Pristine transfinite graphs and permissive electrical networks.** — Un vol. relié,  $16,5 \times 24$ , de XI, 183 p. — ISBN 0-8176-4194-7. — Prix: SFr. 128.00. — Birkhäuser, Boston, 2001.

A transfinite graph or electrical network of the first rank is obtained conceptually by connecting conventionally infinite graphs and networks together at their infinite extremities. This process can be repeated to obtain a hierarchy of transfiniteness whose ranks increase through the countable ordinals. This idea, which is of recent origin, has enriched the theories of graphs and networks with radically new constructs and research problems. This book provides a more accessible introduction to the subject that, though sacrificing some generality, captures the essential ideas of transfiniteness for graphs and networks. Thus, for example, some results concerning discrete potentials and random walks on transfinite networks can now be presented more concisely. On the other hand, the simplifications enable the development of many new results that were previously unavailable.