



Telegraphic Reviews

Author(s): Lynn Arthur Steen

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TELEGRAPHIC REVIEWS

Edited by

Lynn Arthur Steen

with the assistance of

the Mathematics Departments of Carleton, Macalester, and St. Olaf Colleges

Telegraphic Reviews are designed to alert readers in a timely manner to new books and computer software appropriate to mathematics teaching and research. Special codes classify reviews by subject area and appropriate use:

T : Textbook *P* : Professional Reading 1-4: Semester
C : Computer Software *L* : Undergraduate Library **: Special Emphasis
S : Supplementary Reading 13: Grade Level ?? : Questionable

Readers are advised that price information is subject to change. Selected books and software packages receive a second, more extensive review in the *Monthly*.

Books and software submitted for review should be sent to *Reviews Editor, American Mathematical Monthly, St. Olaf College, Northfield, Minnesota 55057.*

General, S*, P*, L.** *Chance and Chaos.* David Ruelle. Princeton Univ Pr, 1991, xi + 195 pp, \$24.95. [ISBN: 0-691-08574-9] A superb, concise exposition of twentieth-century science woven around the red thread of chance. From turbulence to quanta, from strange attractors to "the true meaning of sex," this brief monograph explains for lay persons the profound shift of natural philosophy from phenomena ruled by determinism to events determined by chaos. LAS

General, P*, L. *Selected Works of A.N. Kolmogorov, Volume I: Mathematics and Mechanics.* Ed: V.M. Tikhomirov. Math. & Its Applic., V. 25. Kluwer Academic, 1991, xix + 551 pp, \$199. [ISBN: 90-277-2796-1] "Includes the most important papers by Kolmogorov on mathematics and natural science" (not including probability theory or mathematical statistics). Also contains a short biographical sketch of Kolmogorov, extensive, insightful section of commentaries on his works and a complete list of his works. Everything in English. Note price! BH

General, T*(12-13: 1), S, L.** *Mathematics Meets Technology.* Brian Bolt. Cambridge Univ Pr, 1991, x + 203 pp, \$24.95 (P). [ISBN: 0-521-37692-0] A marvelous potpourri of mechanisms (pulleys, gear trains, cams and ratchets, trapezium linkages, rollers and wheels, scissor action, robotics) with associated mathematics (ge-

ometry measurement, motion). Profusely illustrated; numerous exercises (with answers in back); fascinating ideas for practical projects. A superb "hands-on" approach to kinematics and the geometry of space. LAS

General, S*, P*, L.** *The Art of Mathematics.* Jerry P. King. Plenum Pr, 1992, vi + 313 pp, \$24.50. [ISBN: 0-306-44129-2] An articulate exploration of the role of aesthetics of mathematics as art revealing to lay audiences not only the aesthetic of mathematical thought and the power of applicable mathematics, but also the sociology and psychology academic mathematicians. Compelling, poetic, engaging: enriched with telling anecdotes and acerbic commentary. LAS

Reference, P, L. *Mathematical Book Review Index: 1800-1940.* Louise S. Grinstein. Garland Pub, 1992, xxxvi + 448 pp, \$72. [ISBN: 0-8240-4114-3] An index to published reviews of 3,200 English-language books on mathematics and mathematics education that appeared between 1800 and 1940 (the year *Math Reviews* began). Arranged alphabetically by book, with review references and topic words listed as annotations. Indices provide access via topic words and lists of periodicals that were checked for reviews. LAS

Mathematics Appreciation, S*, P*, L. *From Zero to Infinity: What Makes Numbers Interesting, Fourth Edition.* Constance

Reid. Spectrum. MAA, 1992, xiv + 186 pp, \$19 (P). [ISBN: 88385-505-4] Reprint of a 1955 classic, a "small book on numbers" that offers a mixture of mathematics, history, and folklore about each digit 0...9 plus e and \aleph_0 . Reid's first book; still one of the best on this subject at this elementary level. LAS

Finite Mathematics, T(13), S. *Finite Mathematics for Business and the Social and Life Sciences: A Problem-Solving Approach.* Ruric E. Wheeler. Saunders College, 1991, xviii + 545 pp, \$38 net. [ISBN: 0-03-046939-2] Covers standard material for a finite mathematics course—linear equations, matrices, linear programming, and probability and statistics. Nothing exceptional, but a solid text for a business-oriented course. MPR

Education, P. *Educating Mathematical Scientists: Doctoral Study and the Postdoctoral Experience in the United States.* National Research Council. National Academy Press, 1992, xii + 64 pp, (P). [ISBN: 0-309-04690-4] Report of a study intended to determine characteristics of doctoral and postdoctoral programs in mathematics that are successful in meeting national needs for quantity, quality, diversity, and breadth. Based on visits to ten representative campuses. Stresses the importance of a focused and realistic mission (standard or specialized), positive learning environment, and relevant professional development. "Action, if it starts at all, will start from the faculty." LAS

Education, P, L. *Testing in American Schools: Asking the Right Questions.* John H. Gibbons. Office of Technology Assessment (US Government Printing Office, Washington, DC 20510-8025), 1992, ix + 39 pp, (P). A balanced report on the role of testing in schools, focusing especially on new approaches, current controversies, and policy options. Prepared at the request of Congress, it illustrates various uses of tests, documents common misuses, explores new testing technologies, and analyzes pros and cons of national assessment. A good primer for one of today's most important educational policy issues. LAS

Education, P*, L. *A Core Curriculum: Making Mathematics Count for Everyone.* Steven P. Meiring, et al. NCTM, 1992, viii + 150 pp, \$17 (P). [ISBN: 0-87353-328-3] Three options for curricula—called "crossover," "enrichment," and "differen-

tiated"—that meet the objectives of the 1989 NCTM *Standards* for a three-year high school core curriculum for all students. Also includes a special chapter on "matrices for all" adapted from an innovative Dutch curriculum. Extensive examples illustrate approaches to instruction and assessment that are adaptable to students at different levels. Concludes with a chapter on the process of change—suggestions for how a district can develop and implement a common core curriculum. LAS

Education, L*, P. *Statistical Abstract of Undergraduate Programs in the Mathematical Sciences and Computer Science in the United States: 1990-91 CBMS Survey.* Donald J. Albers, et al. MAA Notes No. 23. MAA, 1992, xx + 173 pp, \$20 (P). [ISBN: 0-88385-080-X] Sixth in a series of data studies published every five years since 1965. In contrast to prior volumes, this report consists primarily of data and charts with minimal interpretive narrative. Some highlights: 38% of total enrollments are in two-year colleges, where there has been a "staggering increase" in part-time faculty, and where over half the courses are remedial. Advanced (post-calculus) enrollments still constitute only 6% of the total. LAS

Education, P*, L*. *Advanced Mathematical Thinking.* Ed: David Tall. Math. Educ. Lib., V. 11. Kluwer Academic, 1991, xvii + 289 pp, \$89. [ISBN: 0-7923-1456-5] Fourteen individually authored chapters carefully edited into a coherent monograph with unified bibliography and index. Surveys contemporary views on mathematical thinking, creativity, and proof from the perspective of cognitive theory, then explores empirical research about learning various parts of college-level mathematics. Seeks to explore and document the immense and surprising cognitive hurdles faced by university mathematics students. An excellent foundation for anyone interested in learning about undergraduate educational research. LAS

History, P, L. *The Apprenticeship of a Mathematician.* André Weil. Transl: Jennifer Gage. Birkhäuser, 1992, 197 pp, \$29.50. [ISBN: 0-8176-2650-6] Sketchy but fascinating memoirs of Weil's early life (up until Hiroshima), including a sojourn in India where he met with Gandhi and Nehru; a detour as a prisoner (for draft dodging) in Finland, England, and France; life in England during the Battle of Lon-

don; and hardships of refugee status in the United States. No mathematics, but many sketches of mathematical people. LAS

History, S*, P*, L.** *The Crest of the Peacock: Non-European Roots of Mathematics.* George Gheverghese Joseph. Penguin Books, 1991, xv + 371 pp, \$12 (P). [ISBN: 0-14-012529-9] An exploration of the global nature of mathematical creativity, motivated by the example of Ramanujan, emphasizing the influence of culture, the diversity of methods, and, fundamentally, the nature of mathematics. Author Joseph, whose own roots are embedded in four widely scattered world cultures, employs a convincing array of evidence to puncture the comfortable uncritical "fertile soil" myth of the Eurocentric evolution of mathematics. Joseph documents the crucial importance of transmission of diverse mathematics across cultures. Well-written, engaging, and unrelenting in its assault on hazy age-old stories. LAS

Number Theory, P*. *Quaternary Quadratic Forms: Computer Generated Tables.* Gordon L. Nipp. Springer-Verlag, 1991, vii + 155 pp, \$59. [ISBN: 0-387-97601-9] Computer-age successor to Brandt-Intrau tables of reduced positive ternary forms. Forms are grouped by discriminant (up through 500), then by genus. Entire table also available on 3.5 inch disc. Should be of interest to researchers interested in classification problems for quadratic forms. MPR

Algebra, P. *Lecture Notes in Mathematics-1437: K-theory and Homological Algebra.* Ed: H. Inassaridze. Springer-Verlag, 1990, 313 pp, \$32 (P). [ISBN: 0-387-52836-9] A selection of nine articles on K -theory and homological algebra presented at the 1987-1988 Seminar on Algebra at Razmadze Mathematical Institute of the Georgian Academy of Sciences, Tbilisi. These are the first publications of works from that long-standing seminar. RB

Complex Analysis, T(17-18), S, P, L. *Classical Complex Analysis.* Mario O. González. Pure & Appl. Math., V. 151. Marcel Dekker, 1992, xiv + 767 pp, \$150. [ISBN: 0-8247-8415-4] Topics from classical theory of analytic functions usually taught in first course. Also covers non-analytic and generalized analytic functions. Comprehensive and dense; will most likely be considered as a reference from which many courses can be drawn. Many examples and exercises. KS

Complex Analysis, S(17-18), P, L. *Complex Analysis: Selected Topics.* Mario O. González. Pure & Appl. Math., V. 152. Marcel Dekker, 1992, xi + 518 pp, \$115. [ISBN: 0-8247-8416-2] Sequel to author's *Classical Complex Analysis* (see TR above). In-depth study of analytic continuation, conformal mappings, entire functions of finite order, meromorphic functions, and an alternative approach to elliptic functions. KS

Complex Analysis, P. *Complex Analysis.* Ed: Klas Diederich. Aspects of Math., V. E17. Friedr Vieweg, 1991, ix + 341 pp, DM 89. [ISBN: 3-528-06413-7] Forty-nine papers on many aspects of complex analysis, mainly in several variables, comprise proceedings of a 1990 International Workshop, Wuppertal, held in honor of H. Grauert. Subjects span Grauert's own wide-ranging areas of interest. PZ

Differential Equations, P. *Solving Ordinary Differential Equations II: Stiff and Differential-Algebraic Problems.* Ser. in Computat. Math., V. 14. E. Hairer, G. Wanner. Springer-Verlag, 1991, xv + 601 pp, \$79. [ISBN: 0-387-53775-9] Contains three chapters: Runge-Kutta methods for stiff problems, multi-step methods for stiff problems, and singular perturbation and differential-algebraic equations. MLR

Partial Differential Equations, P*. *Some Applications of Functional Analysis in Mathematical Physics, Third Edition.* S.L. Sobolev. Transl. of Math. Mono., V. 90. AMS, 1991, vii + 286 pp, \$161. [ISBN: 0-8218-4549-7] A unified treatment via functional analysis of variational methods (with applications to the Dirichlet problem and polyharmonic equations), and of the Cauchy problem for linear equations. Includes a chapter on the necessary results from functional analysis and, as an appendix, the author's 1936 classic paper "Méthode nouvelle à résoudre le problème de Cauchy pour les équations linéaires hyperboliques normales." Note price. MPR

Numerical Analysis, P. *Computer Arithmetic and Self-Validating Numerical Methods.* Ed: Christian Ullrich. Notes & Reports in Math. in Sci. & Eng., V. 7. Academic Pr, 1990, xi + 302 pp, \$39.95. [ISBN: 0-12-708245-X] As computer simulation becomes more common, automatic verification of computed results becomes important so that computational inaccuracies can be distinguished from the effects of the

mathematical model underlying a simulation. This volume presents thirteen invited papers from the first international conference on the topic, Basel, Switzerland, October 1989, together with recommendations for computer manufacturers. RB

Functional Analysis, T(18), S, P. *Rearrangements of Series in Banach Spaces*. V.M. Kadets, M.I. Kadets. Transl. of Math. Mono., V. 86. AMS, 1991, iv + 123 pp, \$72. [ISBN: 0-8218-4546-2] A series $\sum_{i=1}^{\infty} x_i$ converges unconditionally if it converges for any rearrangement of its terms. Text explores relationship between unconditionally and absolutely convergent series in Banach spaces. Initial chapters treat primarily L_p -space setting. Later chapters cover general Banach spaces. Large number of exercises of varying difficulty. Translated from Russian. Clear, well-motivated presentation. BH

Functional Analysis, P. *Lecture Notes in Mathematics-1466: Additive Subgroups of Topological Vector Spaces*. Wojciech Banaszczyk. Springer-Verlag, 1991, vii + 178 pp, \$19 (P). [ISBN: 0-387-53917-4] Several important theorems of commutative harmonic analysis apply more generally than in the traditional setting of locally compact groups. In this monograph the author extends several such results to the more general setting of "nuclear groups." Basic definitions are provided in early chapters. PZ

Geometry, S*, L. *The Fractal Explorer*. Linda Garcia. Dynamic Pr (POB 7534, Santa Cruz, CA 95061), 1991, 108 pp, (P). [ISBN: 0-9628659-0-7] A spritely personal exploration of fractals by a member of the "Designer Fractal" team that created *FractalSketch* (TR, May 1991), *MandelMovie*, and *Chaos* (TR, May 1991). Includes numerous illustrations, virtually no equations, many quotations from the expository literature, and an extensive bibliography of articles and books about fractals. No exercises. LAS

Geometry, S*, L. *Fractals: Endlessly Repeated Geometrical Figures*. Hans Lauwrier. Transl: Sophia Gill-Hoffstädt. Penguin Books, 1991, xiv + 209 pp, £9.99 (P). [ISBN: 0-14-014411-0] British edition of the Princeton paperback *Fractals: Endlessly Repeated Geometrical Figures* (TR, February 1992). A careful exposition for beginners with many full color illustrations. Translated from a 1987 Dutch mono-

graph. LAS

Algebraic Topology, S(17-18), P. *Lecture Notes in Mathematics-1443: Equivariant Surgery Theories and Their Periodicity Properties*. Karl Heinz Dovermann, Reinhard Schultz. Springer-Verlag, 1990, vi + 227 pp, \$24 (P). [ISBN: 0-387-53042-8] A monograph consisting of an introductory survey of equivariant surgery theory (that incorporates the approach of Lück/Madsen), and an exposition of the authors' periodicity results. RB

Topology, P, L. *Hassler Whitney: Collected Papers, Volumes I-II*. Eds: James Eells, Domingo Toledo. Birkhäuser, 1992, \$115 each. *Volume I*, xiv + 590 pp; *Volume II*, xv + 596 pp. [ISBN: 0-8176-3560-2] Virtually all of Whitney's influential papers arranged by subject (graphs and combinatorics; singularities, analytic spaces, manifolds, bundles and characteristic classes, topology, geometric integration theory) and introduced by his own recent retrospective "Moscow 1935: Topology Moves Toward America." Strangely, neither volume contains any hint of Whitney's extensive work in school education. LAS

Topology, P. *Lecture Notes in Mathematics-1440: Topology and Combinatorial Group Theory*. Ed: P. Latiolais. Springer-Verlag, 1990, vi + 207 pp, \$22 (P). [ISBN: 0-387-52990-X] Proceedings of the Fall Foliage Topology Seminar held in New Hampshire (1986-1988) where lively interaction took place in the areas of one- and two-dimensional topology, algebraic topology, and combinatorial group theory amidst an informal, rustic atmosphere. Nineteen papers. RB

Control Theory, P. *Lecture Notes in Control and Information Sciences-164: Differential and Algebraic Riccati Equations with Application to Boundary/Point Control Problems: Continuous Theory and Approximation Theory*. I. Lasiecka, R. Trigiani. Springer-Verlag, 1991, xi + 160 pp, \$29 (P). [ISBN: 0-387-54339-2] From the Preface: "These notes collect, in a unified framework, an updated and rather comprehensive account of results centered on the theory of optimal control with quadratic cost functionals for abstract (linear) equations in a Hilbert space." AWR

Elementary Statistics, T(13-14: 1), S, L. *Quick Answers to Quantitative Problems: A Pocket Primer*. G. William Page, Carl V. Patton. Academic Pr, 1991, xiii

+ 277 pp, \$32.95 (P). [ISBN: 0-12-543570-3] A concise introduction to back-of-the-envelope methods of data analysis for describing, comparing, predicting, validating, and analyzing data required for making decisions. Many examples but no exercises; methods suitable for calculator or spreadsheet use, but also for paper and pencil. Extensive appendices are filled with miscellaneous data often required in business analyses (e.g., international distances, measurement units, city populations, consumer price indices). LAS

Statistical Methods, T(14-18: 1), L. Exploratory and Multivariate Data Analysis. Michel Jambu. Stat. Modeling & Decision Sci. Academic Pr, 1991, xiii + 474 pp, \$79. [ISBN: 0-12-380090-0] Thoughtful introduction to data-analytic methods. Written for people with limited experience of data analysis, but covers a wide variety of topics from one-, two-, and n -dimensional statistical analysis to factor analysis, principal components analysis, correspondence analysis, classification methods, and computing issues. Appendix contains data sets from a variety of disciplines. Text is nice mix of examples and theory. MK

Statistics. Aspects of Nonparametric Density Estimation. A.J. van Es. CWI Tract, V. 77. Centrum voor Wiskunde en Informatica, 1991, 137 pp, Dfl. 39 (P). [ISBN: 90-6196-397-4] Revision of the author's 1988 dissertation. Treats non-smooth densities, bandwidth, and deconvolution. LAS

Programming, T(14-15: 1), S*, P, L.** *The Standard C Library.* P.J. Plauger. Prentice Hall, 1992, xiv + 498 pp, \$28 (P). [ISBN: 0-13-131509-9] A users' and implementers' guide to the ANSI and ISO standard library functions for the C programming language, by an experienced master of programming style. Each chapter (per header file) includes background, Standards excerpts, how to use, implement, and test the library functions, and graded exercises. Unspoken subtleties exposed, software design principles emphasized, 9000 lines of exemplary code included. RB

Languages, T(18: 1), P. Logic of Domains. Guo-Qiang Zhang. Progress in Theoret. Comp. Sci. Birkhäuser, 1991, 259 pp, \$49.50. [ISBN: 0-8176-3570-X] In denotational semantics, one assigns meaning to a program written in a programming language by mapping the elements of that language into a mathematical construct called

a domain. This monograph explores mathematical logical aspects of (SFP and stable) domains, with applications to proof systems for reasoning about programs. Uses denotational semantics, mathematical logic, general topology, category theory. RB

Computer Systems, P, L. Digital Control Systems, Volume 2: Stochastic Control, Multivariable Control, Adaptive Control, Applications, Second Revised Edition. Rolf Isermann. Springer-Verlag, 1991, xxi + 325 pp, \$79. [ISBN: 0-387-50997-6] A complete revision of the *First Edition* split into two volumes. This volume includes thorough discussions of control systems for stochastic disturbances; interconnected, multivariable, and adaptive control systems; digital control with process computers and microcomputers. Aimed at students and engineers in industry looking for an introduction to theory and application of digital control systems. MK

Computer Systems, S, C. Mathematica Help Stack. Robert Campbell. Variable Symbols (2161 Shattuck Ave., Suite 202, Berkeley, CA 94704-1313), 1990, iii + 16 pp, \$99 (P). *Second Edition* (for *Mathematica Version 2*) of a Macintosh hypercard application that provides an on-line tree-structured reference manual for *Mathematica* (*First Edition*, TR, December 1991). Requires at least 8MB to run since the stack itself is 4.1MB; to use simultaneously with *Mathematica* requires either more than 8MB or the program HyperDA. LAS

Computer Systems, S, P*, L.** *Learning GNU Emacs.* Debra Cameron, Bill Rosenblatt. O'Reilly & Assoc, 1991, xxvii + 411 pp, \$24.95 (P). [ISBN: 0-937175-84-6] GNU (for "GNU's Not Unix") Emacs (for Editing Macros), a product of Richard Stallman's Free Software Foundation (FSF), is a powerful, flexible, and very popular "copyleft" UNIX editor (users are authorized to share copies) that includes special features for editing **troff**, **T_EX**, and Scribe documents and C, Fortran, and (especially) Lisp programs. This highly readable guide provides a comprehensive survey of standard (Version 18) Emacs, including special features for Lisp and for text formatters. Appendices provide detail on customization, information on FSF philosophy and licenses, and a quick reference guide. LAS

Computer Systems, P. A Performance Monitor for Parallel Programs. Matthew

H. Reilly. Academic Pr, 1990, xv + 178 pp, \$32.95. [ISBN: 0-12-586330-6] To measure the performance of parallel programs on a multiprocessor system, the author designed and directed construction of a hardware component for the M31 VAX system for monitoring that system in action. The resulting general-purpose monitoring device is an event collector that recognizes and records each action on the multiple processors, with limited effect on the computation being monitored. This dissertation focuses on design tradeoffs. RB

Computer Systems, S*, L. *TEX by Example: A Beginner's Guide*. Arvind Borde. Academic Pr, 1992, xiv + 169 pp, (P). [ISBN: 0-12-117650-9] An innovative approach to explaining TEX: narrative pages on the right illustrating various typographical features, with the corresponding TEX code on the top of the facing left page, accompanied by explanatory footnotes on the bottom of this page. Forty of these two-page examples are followed by a sixty-page glossary with expansive explanations of both commands and features. An epilog gives TEX code used in production of the book, illustrating yet more advanced features. LAS

Computer Systems, S*. *Mathematica Quick Reference, Version 2*. Nancy Blachman. Variable Symbols (Distr: Addison-Wesley), 1992, 304 pp, \$18.95 (P). [ISBN: 0-201-62880-5] *Second Edition (First Edition, TR, December 1991)* of a slim, spiral-bound guide to *Mathematica* commands for Version 2. Includes commands in standard distribution packages, sources of electronic information, and other helpful tidbits. A valuable aid for both novice and expert *Mathematica* users. LAS

Theory of Computation, T(17-18: 1), S, P. *Lecture Notes in Computer Science-454: Combinatorics on Traces*. Volker Diekert. Springer-Verlag, 1990, xii + 165 pp, \$20 (P). [ISBN: 0-387-53031-2] In theoretical computer science, Mazurkiewicz's trace theory concerns free partially-commutative monoids used for the semantics of nonsequential systems, including distributed computing systems, multiprocessor configurations, and communication networks. The trace approach distinguishes concurrency from nondeterminism (cf. Petri nets) while incorporating well-understood sequential theory (cf. Hoare's CSP). Self-contained, no exercises. RB

Computer Science, P, L. *Advances in Computers, Volume 33*. Ed: Marshall C. Yovits. Academic Pr, 1991, xi + 336 pp, \$79.95. [ISBN: 0-12-012133-6] Extended retrospective and prospective articles on computing: a look towards a reusable software-component industry; a review of object-oriented modelling and discrete event simulation; human factors principles for design of dialog with computers; neural networks applied to artificial intelligence; use of computer-assisted visualization in scientific fields. RB

Computer Science, P. *Advances in Computers, Volume 31*. Ed: Marshall C. Yovits. Academic Pr, 1990, x + 405 pp, \$69.95. [ISBN: 0-12-012131-X] Five articles: a multi-disciplinary system design and development methodology based on a military model; modelling human perception in speaker-independent automated speech recognition; analyzing reliability, maintainability, and availability of computer systems as a product selection criterion; molecular computers; the nature of information science. RB

Computer Science, S*(13-18), P*, L*. *Computer Security Basics*. Deborah Russell, G.T. Gangemi, Sr. O'Reilly & Assoc, 1991, xx + 441 pp, \$29.95 (P). [ISBN: 0-937175-71-4] A handbook on computer security that provides both "the big picture and quite a few helpful details." Introductory and historical overview; definitions of viruses, worms, etc.; secure systems administration; encryption; network security; legislation and standards such as U.S. government "Orange Book." A readable source that could be used profitably by professors to enhance courses throughout the curriculum. RB

Applications (Engineering), P. *Lecture Notes in Control and Information Sciences-155: High-Resolution Methods in Underwater Acoustics*. Eds: M. Bouvet, G. Bienvenu. Springer-Verlag, 1991, v + 249 pp, \$35 (P). [ISBN: 0-387-53716-3] Six separately authored chapters in a text on finding "targets" underwater. Slightly more technical than Tom Clancy's *Hunt for Red October*. BC

Applications (Engineering), P. *An Introduction to Direct Access Storage Devices*. Hugh M. Sierra. Academic Pr, 1990, xviii + 260 pp, \$44.95. [ISBN: 0-12-642580-9] Everything you ever wanted to know about the technology of magnetic disk drives, which

are known in the IBM community as direct access storage devices (DASDs), by a long-time designer of those devices. Historical perspective combined with mountains of technical information. Assumes knowledge of magnetic recording, servomechanism design, coding. RB

Applications (Fluid Dynamics), P. *Invariant Manifold Theory for Hydrodynamic Transition*. S.S. Sritharan. Pitman Res. Notes in Math. Ser., V. 241. Longman Scientific & Technical (US Distr: Wiley), 1990, 163 pp, \$32 (P). [ISBN: 0-582-06781-2] Rigorous treatment provides link between hydrodynamic transition and finite dimensional dynamical systems. Results include spectral theorems and smoothness theorems. SP

Applications (Physical Science), P, L. *Cellular Automata: Theory and Experiment*. Ed: Howard Gutowitz. MIT Pr, 1991, xvii + 483 pp, \$37.50 (P). [ISBN: 0-262-57086-6] Thirty-four articles on cellular automata with titles like "cellular automata and multifractals," "criticality in cellular automata," "simulation of HIV-infection in artificial immune systems," "knot invariants and cellular automata," and "cellular automata and discrete neural networks." BC

Applications (Physics), T(18: 1, 2), S, P. *Quantum Signatures of Chaos*. Fritz Haake. Ser. in Synergetics, V. 54. Springer-Verlag, 1991, xv + 242 pp, \$59. [ISBN: 0-387-53144-0] Written with unusual clarity and sensitivity for the fine points of mathematics, this text emphasizes random-matrix theory rather than periodic orbit theory. MU

Applications (Physics), T(18: 1, 2), S, P. *Renormalization and Asymptotic Expansions*. V.A. Smirnov. Progress in Physics, V. 14. Birkhäuser, 1991, x + 380 pp, \$85. [ISBN: 0-8176-2640-9] Organized into three parts: Part I, Regularized Feynman Amplitudes describes divergences and singularities of Feynman amplitudes; Part II, Removal of Divergences characterizes standard renormalization schemes; and Part III, Asymptotic Expansions provides explicitly finite formulae for coefficient functions of operator and diagrammatic expansions in the limits of large momenta and masses. Each part begins with an introduction and ends with a detailed bibliography. Analytic proofs are usually included. MU

Applications (Physics), S(18), P. *Dynamical Systems and Statistical Mechanics*. Ed: Ya. G. Sinai. Advances in Soviet Math., V. 3. AMS, 1991, viii + 254 pp, \$127. [ISBN: 0-8218-4102-5] Collection of papers presented at the Seminar on Statistical Physics held at Moscow State University covering such topics as the renormalization group method in the theory of dynamical systems, the hyperbolic theory of dynamical systems, and the theory of random media. MU

Applications (Physics), P, L. *Twistors in Mathematics and Physics*. Eds: T.N. Bailey, R.J. Baston. London Math. Soc. Lect. Note Ser., V. 156. Cambridge Univ Pr, 1990, 384 pp, \$34.50 (P). [ISBN: 0-521-39783-9] The "Twistor Program" is the search for a theory which unites Einstein's General Relativity with quantum physics. Herein are eighteen review articles covering twistors from both the mathematical and physical perspectives. Includes an introductory article by Penrose surveying the history of twistors and its future. MPR

Applications (Physics), T(18: 1-3), S, P, L. *Quantum Physics, Relativity, and Complex Spacetime: Towards a New Synthesis*. Gerald Kaiser. Math. Stud., V. 163. North-Holland (US Distr: Elsevier Science), 1990, xvi + 359 pp, \$85.75. [ISBN: 0-444-88465-3] Complex differential geometry facilitates the synthesis of quantum mechanics and relativity. Wave functions and fields can be extended to complex spacetime and these extensions form a relativistic generalization of the coherent-state representation. A lucid text filled with carefully developed mathematics. MU

Applications (Physics), S(18), P. *Symmetries in Science V: Algebraic Systems, Their Representations, Realizations, and Physical Applications*. Eds: Bruno Gruber, L.C. Biedenharn, H.D. Doebner. Plenum Pr, 1991, ix + 613 pp, \$135. [ISBN: 0-306-43895-X] The proceedings of a symposium (of the same name) held at the Landesbildungszentrum Schloss Hofen, Vorarlberg, Austria during the summer of 1990. MU

Applications (Physics), S(18), P. *Geometry and Theoretical Physics*. Eds: J. Debrus, A.C. Hirshfeld. Springer-Verlag, 1991, x + 323 pp, \$59. [ISBN: 0-387-53570-5] Focuses on the applications of twistor geometry to problems arising from theoretical physics. Divided into three parts: Part I, Geometry (the Klein Correspondence)

dence, fiber bundles, the algebraic topology of manifolds and bundles); Part II, Classical Field Theory (linear field theories, gauge theory, general relativity); and Part III, the Penrose Transformation (massless free fields, self-dual gauge fields, twistors for self-dual space-time, the Penrose Transform for general gauge fields). Topics not covered include twistor approaches to quantum field theory, the quasilocal mass formula, and invariants of four-manifolds. MU

Applications (Physics), S(18), P. *Many Particle Hamiltonians: Spectra and Scattering*. Ed: R.A. Minlos. Adv. in Soviet Math., V. 5. AMS, 1991, vi + 194 pp, \$75. [ISBN: 0-8218-4104-1] Collection of six papers covering the following topics: the spectral properties of the matrix-valued Friedrichs Model, asymptotic completeness for an infinite number of Fermions, the pointlike interaction of three different particles, Meson states in lattice QCD, and Hamiltonians in solid-state physics as multiparticle discrete Schrödinger operators. MU

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