

Computational Ocean Acoustics

F. B. Jensen, W. A. Kuperman, M. B. Porter, et al.

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H. Helmholtz, J. von Neumann, L. Brillouin, and M. Delbrück, and the high quality of the articles. This collection is designed for physicists entering or working in the field of neural networks, to provide the interdisciplinary background and context for their work and to indicate some of the important contributions that have already been made in the area of statistical physics of neural networks.

—S. M.

Everybody's Guide to the Internet

Adam Gaffin

MIT Press, Cambridge, MA, 1994; ISBN 0-262-57105-6, 211 pp., softcover, \$14.95.

A beginner's guide written for users with dial-up-only access to the Internet. It provides brief lists of service providers and resources on the Net as well as rudimentary instructions for using the standard suite of Internet applications.

—A. J. M.

Cellular Automata and Complexity

Stephen Wolfram

Addison-Wesley, Reading, MA, 1994; ISBN 0-201-62716-7, 596 pp., hardcover, \$45.25; ISBN 0-201-62664-0, 596 pp., softcover, \$24.75.

In the form of a Stephen Wolfram retrospective, this volume is a compilation of the scientific papers of Mathematica's™ "enfant terrible" during the early and mid-1980s. During this period, Wolfram embarked upon an intense study of the ways in which the complex behavior of systems and the rules of large-scale order can arise from the microscopic action of entities that follow very simple sets of rules—the so-called cellular automata. In the 19 papers in this collection, Wolfram deals with the algebraic and statistical properties of systems of cellular automata, the emergence of universal behaviors and complexity, the use of cellular automata in modeling continuous systems, and the properties of computational complexity, universality, and irreducibility—those

features of certain classes of cellular automata that allow them to be considered viable candidates as models for the fundamental structures of nature.

—A. J. M.

Machines That Learn: Based on the Principles of Empirical Control

Robert Alan Brown

Oxford University Press, New York, NY, 1994; ISBN 0-19-506966-8, 891 pp., hardcover, \$75.

Brown sets out to "describe the design of a natural computer that learns and acts like the animal brain," approaching this task primarily from an engineering perspective. In pursuing this endeavor, he not only has to handle the technical issues; he must also specify the defining characteristics of the animal brain and how it learns and functions. His treatment is organized into five major sections: goals in the study of empirical control, predetermined controlled machines, empirical machines, networks of empirical machines, and empirical behavior. Although much of the book is technical in focus, an underlying theme is the common ground between living organisms and nonliving systems, which he develops in the last section.

—S. M.

Computational Geometry in C

Joseph O'Rourke

Cambridge University Press, New York, NY, 1994; ISBN 0-521-44034-3, 346 pp., hardcover, \$59.95; ISBN 0-521-44592-2, 346 pp., softcover, \$24.95.

Advertised as "the first textbook suitable for introducing undergraduate students to the design of geometry algorithms," O'Rourke focuses on the design of algorithms for solving problems in discrete geometry, wherein objects are primarily constructed from, and have properties derived from, the properties of polygons. The topics covered in the text—convex hulls, Voronoi diagrams, arrangements, searching, and motion planning—are finding increasing applications in pattern recognition,

visualization, and robotics (not to mention how to slice a ham and cheese sandwich so that both parts have equal portions of ham, cheese, and bread.)

—A. J. M.

Numerical Methods for Physics

Alejandro L. Garcia

Prentice-Hall, Englewood Cliffs, NJ, 1994; ISBN 0-13-151986-7, 368 pp., hardcover, \$63.

An attractive-looking newcomer in the rapidly expanding category of textbooks written to support undergraduate courses in computational physics. Garcia takes a pragmatic approach and caters to the needs of his audience by emphasizing the solution of interesting physical problems using standard methods with an appropriate yet unburdensome level of concern for computational artifacts. The book adopts MATLAB as its language for code fragments, and Garcia argues convincingly for its advantages, although he also provides sample Fortran code at the end of each chapter. A significant portion of the text is devoted to methods of solving both ordinary and partial differential equations—singly and in systems. Other topics include matrix solutions of linear systems, numerical integration, and stochastic/Monte Carlo methods. The book has an easy-to-read look, and Garcia writes in an inviting and informal style.

—A. J. M.

Computational Ocean Acoustics

F. B. Jensen, W. A. Kuperman, M. B. Porter, and H. Schmidt

American Institute of Physics Press, Jericho, NY, 1994; ISBN 1-56396-209-8, 612 pp., hardcover, \$85.

Designed as a text for a course covering the theoretical background and numerical methods needed to model the real ocean environment, this book begins with a chapter on the fundamentals of ocean acoustics, then discusses wave-propagation theory, ray methods, wavenumber integration techniques, and

normal modes. There are also chapters treating parabolic equations, finite-difference and finite-element methods, broadband modeling, ambient noise, and signals in noise. The style is clear, direct, and mathematically complete. Examples are scattered throughout the text, providing numerous illustrations of practical applications, and each chapter ends with an extensive list of references, but there are no separate suggested problems. Sixteen beautiful color plates, some comparing results from different solution methods, are also included.

—S. M.

Oceanography and Acoustics: Prediction and Propagation Models

Allan R. Robinson and Ding Lee, eds.

American Institute of Physics Press, Jericho, NY, 1994; ISBN 1-56396-203-9, 257 pp., hardcover, \$65.

This collection of nine papers provides an overview of recent research progress in linking models predicting ocean dynamics and those describing acoustical propagation in the ocean. One aim is to introduce this area to nonspecialists. The book begins with a very brief discussion by the editors of ocean variability, acoustic propagation, and coupled models. Subsequent papers explore these topics in more depth, focusing on, for example, the effects of ocean environmental variability on underwater acoustic propagation forecasting, surface-duct propagation and the ocean mixed layer, a dynamical system for acoustic applications, and three-dimensional effects. The book ends with a twenty-page comprehensive bibliography, to guide the reader in search of more information.

—S. M.

Stereo Computer Graphics and Other True 3D Technologies

David F. McAllister, ed.

Princeton University Press, Princeton, NJ, 1993; ISBN 0-691-08741-5, 267 pp., hardcover, \$75.

A compilation of contributions from 14 authors on topics related to "true

3D" visualization. By "true 3D," the editor means to distinguish and limit the book's attention to those techniques that take advantage of binocular disparity—the presentation of different images to the left and right eyes. In an introductory chapter, McAllister defines terms and presents a taxonomy of techniques. Subsequent chapters treat perceptual and image composition considerations, computational algorithms, the produc-

tion of "hard copy" including holograms and random dot stereograms, implementation issues in interactive systems, and a variety of true-3D methods including time-multiplexing, moving-slits, parallax illumination, chromostereoscopy, oscillating mirrors, and true volumetric displays. About 300 references to the literature are provided in an appendix.

—A. J. M.

Books Received

The Book of Genesis: Exploring Realistic Neural Models with the General Neural Simulation System

James M. Bower and David Beeman, Springer-Verlag (TELOS), New York, NY, 1994; ISBN 0-387-94019-7, 409 pp., hardcover, \$49.95.

Deterministic Explanation of Quantum Mechanics Based on a New Trajectory-Wave Ordering Interaction

Billie Jack Dalton, North Star Press, St. Cloud, MN, 1994; ISBN 0-87839-091-X, 79 pp., softcover, \$29.95.

Dynamic Modeling

Bruce Hannon and Mathias Ruth, Springer-Verlag, New York, NY, 1994; ISBN 0-387-94309-9 (Mac), 248 pp., hardcover, \$59.95 (w/ disk).

Dynamics: Numerical Explorations

Helena E. Nusse and James A. Yorke, Springer-Verlag, New York, NY, 1994; ISBN 0-387-94334-X, 484 pp., softcover, \$49.95 (w/ MS-DOS diskette).

Fields of Physics on the PC

Gunnar Bastrom, Studenlitteratur, Chartwell Bratt Ltd., Lund, Sweden, 1994; ISBN 91-44-48671-5, 312 pp., softcover.

A First Course in Discrete Dynamical Systems

Richard A. Holmgren, Springer-Verlag, New York, NY, 1994; ISBN 0-387-94208-4, 214 pp., softcover, \$29.

Frontiers of Scientific Visualization

Clifford A. Pickover and Stuart K. Tewksbury, eds., John Wiley & Sons, New York, NY, 1994; ISBN 0-471-30972-9, 284 pp., softcover, \$34.95.

A Guide to Maple

E. Kamberich, Springer-Verlag, New York, NY, 1994; ISBN 0-397-94116-9, 250 pp., hardcover, \$29.

Parallel Substitution Algorithm: Theory and Application

S. Achasova, O. Bandman, V. Markova, and S. Piskunov; World Scientific Publishing, Singapore, 1994; ISBN 981-02-1777-3, 220 pp., hardcover, \$38.

REDUCE for Physicists

N. MacDonald, Institute of Physics, Bristol, UK, 1994; ISBN 0-7503-0277-1, 167 pp., hardcover, \$49.

Solving Problems in Scientific Computing Using Maple and MATLAB

W. Gander and J. Hrebicek, Springer-Verlag, New York, NY, 1993; ISBN 0-387-57329-1, 277 pp., softcover, \$39.

Symbolic Recipes: Scientific Computing with Maple

R. M. Corless, Springer-Verlag, New York, NY, 1994; ISBN 0-387-94210-6, 300 pp., hardcover, \$35.

Trajectories Through Knowledge Space: A Dynamic Framework for Machine Comprehension

Lawrence A. Bookman, Kluwer, Norwell, MA, 1994; ISBN 0-7923-9487-9, 296 pp., \$89.95.

Waves Called Solitons

M. Remoissenet, Springer-Verlag, New York, NY, 1994; ISBN 0-387-57000-4, 236 pp., softcover, \$49.