

10[65-02, 65C05, 65C10].—ISTVÁN DEÁK, *Random Number Generators and Simulation*, Mathematical Methods of Operations Research, Vol. 4, Akadémiai Kiadó, Budapest, 1990, 342 pp., 24½ cm. Price \$46.00.

Several books on random number generation and simulation methods have appeared in recent years, so the potential reader of this one will want to know, first of all, what distinguishes it from the rest of the crowd. A prominent feature of this monograph is certainly the strong emphasis on computational and algorithmic aspects. All algorithms for random number and random variate generation and other computational procedures are carefully described in terms of step-by-step prescriptions and are often followed by examples with illustrative numerical data. Furthermore, the multivariate case receives a more thorough treatment in this book than is customary. In view of the current trend towards parallelization in simulation methods, this is definitely a very useful and timely feature. The reader will also find some well-chosen practical examples of simulation methods, such as the optimal water level regulation of a lake which is modeled by a stochastic programming problem.

The book starts out with providing background on probability theory and statistics in Chapter 1. The next chapter is mainly devoted to uniform pseudorandom numbers, but there is also a brief discussion of quasi-Monte Carlo methods and quasirandom points. Chapter 3 turns to general methods for random variate generation, both for continuous and for discrete distributions. A detailed treatment of random variate generation for special classes of distributions, such as normal distributions, exponential distributions, and beta distributions, is given in Chapter 4. Methods for random vector generation, including methods for generating uniformly distributed points in special domains such as simplices, balls, and spheres, are discussed in Chapter 5. Chapter 6 contains the basics of the Monte Carlo method as well as special sampling techniques and methods for variance reduction, while Chapter 7 describes several Monte Carlo techniques developed by the author for computing the distribution function of multivariate normal distributions. The last chapter offers a cross section of various types of applications of simulation methods, ranging from large systems of linear equations to simulated annealing.

With its ample supply of examples and its many useful hints for actually carrying out simulations, the book is geared towards the practitioner. The author takes great care to lead the applications-oriented reader to a stage where he/she can implement simulation methods concretely. The underlying theory is treated only to the extent that is necessary to understand the algorithms.

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11[68-01, 68Q40].—F. BRACKX & D. CONSTALES, *Computer Algebra with LISP and REDUCE: An Introduction to Computer-Aided Pure Mathematics*, Mathematics and Its Applications, Vol. 72, Kluwer, Dordrecht, 1991, xii + 264 pp., 24½ cm. Price \$54.00/Dfl.160.00.

The REDUCE Computer Algebra system has a long history of wide distribution on a variety of computers. Its international community continues to use and improve the program, under the coordination of its original author, A. C. Hearn at the RAND Corp.

This text, which is based on a series of lectures on the LISP programming language and on REDUCE, appears to target an audience of persons who have acquired a REDUCE system but are (a) completely unfamiliar with algorithms for symbolic computation, and are (b) interested in seeing some applications.

Chapter 1 is a very brief (17-page) introduction to computer algebra systems' general capabilities. See Buchberger et al. [1] for a collection of more accurate reports and bibliographic information.

Chapter 2 (88 pages) describes "Standard LISP". Since REDUCE is written in this language (actually, Portable Standard LISP), it is necessary to know LISP to gain an in-depth understanding of the internal operation of REDUCE. Yet persons learning LISP for the first time should certainly seek an alternative to this treatment. The authors dwell on those features that should be avoided in writing programs in LISP, yet ignore important concepts such as data abstraction.

Since Brackx and Constales go to the effort of presenting LISP, one might reasonably expect to learn how the system REDUCE is written, preferably described in layers of abstraction covering up the gritty implementation details. Such a description could demonstrate to the novice how easy it is to (say) differentiate expressions. But this is entirely missing.

Chapter 3 is a summary of the REDUCE user manual.

Chapter 4 is a collection of brief programming examples, and Chapter 5 is a 50-page description of a set of programs dealing with Euclidean geometry (for example, given a certain description of a figure, rotate it). The 9-entry bibliography and the 6-page index do not strengthen the book.

I found the title of this book misleading since there is virtually no description of how REDUCE performs any of its computer algebra, nor is there any indication of what is easy or difficult to automate in mathematics generally, or why. The promise of an "introduction to computer-aided pure mathematics" is unfortunately not fulfilled.

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1. B. Buchberger, G. E. Collins, and R. Loos (eds.), *Computer algebra: Symbolic and algebraic computation*, 2nd ed., Springer-Verlag, Wien and New York, 1983.

12[13Pxx, 14Qxx, 20B40, 20C40, 68Q40].—G. M. PIACENTINI CATTANEO & E. STRICKLAND (Editors), *Topics in Computational Algebra*, Dordrecht: Kluwer Academic Publishers, 1990, iii + 261 pp., 24½ cm. Price \$99.00/Dfl.160.00.

Computational algebra is a quickly expanding area, in which good books are still rare. Hopeful expectation put me in a forgiving mood when I started to review this book.

Therefore, the graphic design of *Topics in Computational Algebra* will not be ascribed to the lack of taste of anybody in particular; the amateuristic artwork on the cover (showing a personal computer that must have looked old-fashioned at least a decade ago) starkly contrasts with the choice of expensive acid-free paper and a plasticized hard cover by the publisher. Likewise, I am willing to