

REVIEWS AND DESCRIPTIONS OF TABLES AND BOOKS

The numbers in brackets are assigned according to the indexing system printed in Volume 28, Number 128, October 1974, pages 1191–1194.

34 [2].—G. GOOS, J. HARTMANIS & K. NICKEL, Editors, *Interval Mathematics*, Lecture Notes in Comput. Sci., Springer-Verlag, Berlin, Heidelberg, New York, 1975, vi + 331 pp., 24 cm. Price \$12.90.

This volume is the proceedings of the International Symposium, Karlsruhe, West Germany, May 20–24, 1975. It contains six invited lectures and 26 contributed papers.
J. B.

35 [3].—GILBERT STRANG, *Linear Algebra and Its Applications*, Academic Press, New York, 1976, xi + 374 pp., 24 cm. Price \$11.95.

In the preface, Strang says,

“Linear algebra allows and even encourages a very satisfying combination of both elements of mathematics—abstraction and application.” The author provides just such a satisfactory treatment of linear algebra. With exceptional clarity, the basic ideas are developed and supplemented by concrete algebraic and geometric illustrative explanations. If this were all that the author provided, then the book would be outstanding. But, he makes the work a masterpiece by skillfully introducing nontrivial applications and weaving them into his delightful presentation. Of course, the author’s experience in applying numerical methods to a broad spectrum of fields has tempered his judgement. He not only points out the implications of the theorems, but he explains how to choose the numerical methods that will be most efficient. In a trend setting way, the pseudo-inverse and the singular value decomposition of a matrix are carefully developed; the structure of the linear systems that arise in difference methods and in finite element methods are analyzed. The author suggests how the book may be used for four different courses: numerical linear algebra; linear algebra for statistics; linear algebra in economics; basic linear algebra.

Here is a mature work, sprinkled with subtle humor, that will have a profound influence on the teaching of linear algebra.

E. I.

36 [3.05, 3.10, 3.25].—A. BRAMPELLER, R. N. ALLAN & Y. M. HAMAN, *Sparsity*, Pitman, London, 1976, 177 pp., 24 cm. Price £ 7.00, \$15.90.

This is a nice little book (177 pages) written by electrical engineers for electrical engineers. However, it covers many topics in sparsity—network problems, sparse elimination, sparse linear programming, and sparse nonlinear problems—making an excellent (and readable) introduction to these topics, suitable for anyone wanting to know what sparsity is about.

However, I do find it peculiar that a book with a 1976 publishing date has no reference past 1972 (except for a few to the authors’ own work), especially in a field in which so much current work is being produced.

There is only one code presented in the book—and that is a FORTRAN program for calculating the *inverse* of a full matrix! They do state that the inverse of a sparse matrix tends to be full and do not recommend the inversion of sparse matrices. But

will engineers never learn that they need not invert full matrices!

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- 37 [3.25].—G. GOOS, J. HARTMANIS & G. I. MARCHUK, Editors, *Optimization Techniques*, IFIP Technical Conference, Lecture Notes in Comput. Sci., Springer-Verlag, Berlin, Heidelberg, New York, 1975, viii + 507 pp., 24 cm. Price \$16.80.

This volume contains papers presented at the IFIP Technical Conference on Optimization Techniques held at Novosibirsk, July 1–7, 1974. There are 17 papers on system modeling and identification, 15 papers on optimal control, 26 papers on mathematical programming and numerical algorithms and 12 papers on the theory of games.

J. B.

- 38 [5].—BERT HUBBARD, Editor, *Numerical Solutions of Partial Differential Equations*, Academic Press, New York, 1976, ix + 499 pp., 24 cm. Price £ 13.00, \$25.00.

This is the proceedings of the Symposium on the Numerical Solution of Partial Differential Equations. III. The following is taken from the preface:

The Symposium on the Numerical Solution of Partial Differential Equations, SYNSPADE 1975, was the third in a series on this topic held on the campus of the University of Maryland, College Park, at 5-year intervals. During the week of 19–24 May 1975, researchers gathered at the Adult Education Center to listen to invited lectures and contributed papers and to discuss with each other the most recent developments in this field. This volume contains the invited addresses in full and a list of the contributed papers.

The emphasis of this symposium was on those difficult problems in partial differential equations exhibiting some type of singular behavior. This is a very broad topic that includes singular behavior of solutions induced by the geometry such as corners or the nature of the differential equation itself. Talks were given on the effects of nonlinearities, such as bifurcation, which occur in problems of nonlinear mechanics. Also discussed were equations of changing type and those with rapidly oscillating coefficients. The point of view of the symposium itself was to give equal weight to discussions of the mathematical models and their relation to experiment, behavior of solutions of the partial differential equations involved, and effective computational methods for their numerical solution.

J. B.

- 39 [5.10, 5.20, 13.05, 13.15].—J. R. OCKENDON & W. R. HODGKINS, Editors, *Moving Boundary Problems in Heat Flow and Diffusion*, Clarendon Press, Oxford, 1975, x + 300 pp., 24 cm. Price £ 6.00, \$19.25.

This volume contains papers and discussions presented at a conference at the University of Oxford, England, on March 25–27, 1974.

The aim of the conference can be stated with the following summary of parts of the preface:

Since moving boundary problems (generalized Stefan problems) occur in many diverse industrial and other situations, and since results in one field were not readily available to researchers in a different field, it was decided to bring together research workers from as many different fields as possible, along with applied mathematicians and numerical analysts.

The organizers have succeeded in fulfilling their aims and have produced an interesting conference report; the papers range from industrial applications to theoretical investigations of analytical and numerical methods. At least for some years into the future this