

these papers here rather than through the normal channels of selection by the numerous journals.

Among the many excellent papers on the general theory of partial differential equations should be mentioned those of Leray, Moser, Hörmander, and Morrey. An interesting new type of problem is set up and solved by B. Frank Jones; in this problem, a coefficient function in the partial differential equation is to be determined by initial and boundary data that would lead to an overdetermined problem if the coefficient were fixed. This type of problem obviously has great use in applications to complicated systems whose constitution is only partly known; results of this kind make possible inferences about the internal nature of the system from use of observations on the boundaries.

Three papers concern directly techniques or error estimates in numerical calculation. Jim Douglas, Jr. sets up an alternating direction method for iterative solution of Laplace's equation in any number of dimensions. From the error estimates he concludes that this method is the most efficient known for Laplace's equation over a rectangular parallelepiped. The brothers Nitsche obtain error estimates for the computation of certain integrals in whose integrands occur solutions of elliptic differential equations. Poritsky discusses improvement of convergence. Weinberger obtains bounds for the square of the norm of the error in the Rayleigh-Ritz procedure, on the assumption that lower bounds for the desired proper numbers are known.

C. TRUESDELL

The Johns Hopkins University
Baltimore, Maryland

50 [V, W, Z].—BENJAMIN MITTMAN & ANDREW UNGAR, *Computer Applications—1960*, The Macmillan Co., New York, 1961, vi + 193 p., 24 cm. Price \$5.75.

This small volume contains papers from the 1960 Computer Applications Symposium sponsored by the Armour Research Foundation. It is divided into two sections. Part One, "Business and Management Applications," includes the use of automatic data processing systems for handling subscription lists, information retrieval in libraries, and filling mail-orders; Part Two, "Engineering and Scientific Applications," presents applications of computers in weather forecasting, the design of optical lens systems, and electronic data communications. The wide spectrum of applications described in these papers vividly demonstrates the impressive and fast-growing uses of digital computers in management, business, engineering and scientific research. A list of titles and authors follow:

- Electronic Processing of 10 Million Subscription Records—B. H. Klyce
- Prediction of Program Running Time as an Aid in Computer Evaluation—
T. J. Tobias
- A COBOL Processor for the UNIVAC 1105—J. J. Jones
- The Computer in the Library—V. W. Clapp
- Computer Control of Mail-Order House Operations (IBM-650 Tape RAMAC)—
S. Kritzik
- An Electronic Computer in Economic Research—M. H. Schwartz

- A Generalized Brokerage Accounting System (RCA 501)—A. B. Goldstein
 Solution of Naval Numerical Weather Problems (CDC 1604)—P. M. Wolff
 Systems and Standards Preparations for a New Computer (Philco 2000)—
 H. S. Bright
 Computer Design of Optical Lens Systems (IBM-704)—J. C. Holladay
 LOGLAN and the Machine—J. C. Brown
 Data Communications Between Remote Machines—V. N. Vaughn, Jr.
 Some Observations on ALGOL in Use (Burroughs 220)—J. G. Herriot
 The Role of a Professional Society in Program Exchange—W. M. Carlson

MILTON SIEGEL

Applied Mathematics Laboratory
 David Taylor Model Basin
 Washington 7, D. C.

- 51 [W].—A. CHARNES & W. W. COOPER, *Management Models and Industrial Applications of Linear Programming*, Vol. II, John Wiley & Sons, Inc., New York, 1961, xiv + 861 p., 26 cm. Price \$11.75.

Those familiar with the previous work of the authors will expect, and find, a well-written work thoroughly covering the field laid out for it. The emphasis is on linear programming, with some discussion and illustration by means of simplified applications to industry. Relatively little space is devoted to the practice of formulating and constructing mathematical models.

The book being reviewed is the second of two volumes. Volume I may properly be considered an introduction to Volume II. Topics covered in the second volume include the modified simplex and dual methods (with a discussion of the evolution of computer codes using the revised simplex method), transportation type models, dyadic models and subdual methods, the development of model prototypes and compression, networks and incidence type models, game theory and linear programming, and a collection of miscellaneous topics, including integer programming. Appendices treat such topics as the double-reverse method, mixing routines, and saddle points.

The treatment is broad, fully explained and amply illustrated numerically. The exposition, in this reviewer's opinion, would have been smoother if less recourse were taken to extensive footnotes. The footnotes per chapter frequently exceed 70 in number.

Equations have been attractively set into type, but all figures and tables have been reproduced directly from typewritten copy, which detracts from the over-all quality.

One further anomaly requires mention. Included in the book is an extensive bibliography numbering over 560 citations. On the other hand, the index to Volume II appears to be a skimpy afterthought. A book as potentially useful as this deserves a far better tool.

JACK MOSHMAN

C.E.I.R., Inc.
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