it fares quite badly as a few examples will indicate: In the chapter on eigenvalue/vector computation, the stress is put on methods which first find the characteristic polynomial (Krylov, Danilevsky). Although the power method is also discussed, no mention is made of the Givens-Householder method nor the LR/QR methods. In the discussion of Gaussian elimination for linear equations, no mention is made of the need for interchanges except when a pivot is zero. In various places throughout the book, a problem is reduced to a system of linear equations $Ax = b$ (e.g., in the least squares problem of Chapter 3) and this is followed by a directive to form $x = A^{-1}b$ where "the inverse matrix can be obtained, for example, by the augmented matrix method described in Chapter 1" (p. 149). The chapter which covers numerical integration says nothing about Gaussian quadrature or Romberg integration.

The above omissions would not be so bad if adequate references to the literature were provided. However, although 156 pages are devoted to linear equations, eigenvalues, and roots of polynomials, and 16 references are given, no mention is made of Wilkinson. Similarly, Chapters 6, 7, and 8 on differential equations contain references to several books as well as papers, but no mention of the standard works by Henrici, Varga, and Forsythe and Wasow.

All in all, this reviewer unfortunately must conclude that the book is very uneven and does little justice to the advances made in numerical analysis in the last twenty years.

J. M. O.

51 [2.00, 3, 4, 8, 13.00].—Brice Carnahan, H. A. Luther & James O. Wilkes, *Applied Numerical Methods*, John Wiley & Sons, Inc., New York, 1969, xvii + 604 pp., 29 cm. Price $14.95.

This new, rather unevenly written and organized, compendium is a good reference book for the practicing engineer. The contents include interpolation, approximation, numerical integration, solution of polynomial equations, matrices, systems of equations, approximate solution of ordinary differential equations, approximate solution of partial differential equations, and statistical methods. Documented Fortran programs, experienced remarks on computational procedures, and meaningful applied illustrative problems are distributed abundantly throughout.

Pedagogically, however, the book presents severe problems. The sensitivity, depth, and yet low key presentation of the material on interpolation, ordinary differential equations, and parabolic equations conflicts radically with, for example, the material on matrices, in which an entire matrix course, without the more complex proofs but with selected short ones, has been compacted into a single chapter. The authors' habit of doing *all* the problems in the book on a computer, even when the exact solution is attainable by methods from high school algebra (see, e.g. p. 173), is one *not* worth passing on to readers and students. And the omission of such important contemporary topics as analysis of roundoff error in algebraic processes, spline interpolation, integral equations, Monte Carlo techniques, boundary value problems for ordinary differential equations, hyperbolic partial differential equations, the Navier-Stokes equations, linear and nonlinear programming methods, and discrete model theory give the book a sense of age and weight similar to that associated with dictionaries and encyclopedias, to which one rarely turns for inspiration and vitality.

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52 [2.05].—AMERICAN MATHEMATICAL SOCIETY TRANSLATIONS, *Fourteen Papers on Series and Approximation*, American Mathematical Society, Providence, R. I., 1968, iv + 266 pp., 25 cm. Price $13.60.

Except for a paper of I. M. Vinogradov (Estimation of Trigonometric Sums), motivated by additive number theory, all papers of this volume belong to the theory of approximation or to related branches of analysis (orthogonal series). Short reviews follow.

Balasov has very neat theorems about series of Rademacher functions and about series of the form $\sum a_k f(n_k x)$.

Osipov generalizes work of Ul'janov and R. P. Agnew and shows that if $\sum_{n=1}^{\infty} a_n^2 = \infty$, and if f is measurable on (0, 1), then there exists an orthonormal system ϕ_n for which $\sum_{n=1}^{\infty} a_n \phi_n(x)$ converges everywhere to $f(x)$ for any rearrangement of its terms. The paper of *Jastrebova* deals with Walsh-Fourier series.

Among the papers on Fourier series, *Bojanić* and *Tomić* deal with the absolute convergence of Fourier series with gaps for which $n_{k+1} - n_k \geqq$ const. *M. F. Timan* discusses the approximation in spaces L^p of f by the λ-means of its Fourier series, where λ stands for many classical summability matrices. *Berdysev* estimates $\sup_f |a_n(f)|$, $\sup_f \|f - s_n(f)\|_\infty$, when the modulus of continuity of f is given. Two papers deal with the degree of approximation, in a Banach function space X, of a function f by trigonometric polynomials. *Cyganok* has generalizations of Jackson's estimate (involving moduli of continuity of the function f or of its derivatives) for the degree of approximation of f in an Orlicz space norm. *A. V. Efimov* relates the lower estimate for the degree of approximation of a class $M \subset X$ to the supremum of $\|\phi\|_x$, where ϕ are all functions of M which are "cos nx-symmetric," and finds this supremum for several classes M.

Teljakovskii answers positively a question proposed by this reviewer, and proves that for $f \in C^r[-1, 1]$ there exists a sequence of algebraic polynomials P_n for which

$$|f(x) - P_n(x)| \leqq C((1 - x^2)^{1/2}/n)^r \omega(f^{(r)}, (1 - x^2)^{1/2}/n), \qquad n \geqq r.$$

G. C. Tumarkin in 2 papers treats the possibility of approximation, in the norm of L_σ^p, of a function by rational functions with prescribed poles. *Lizorkin* has inequalities of Bernštein type for fractional derivatives. Finally, *Suetin* discusses uniqueness properties of interpolation series for certain analytic functions.

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