methods and properties, examples and applications, orthogonal polynomials, convergence and analytic theory, Padé approximants, varia.

6. Number theory, set and probability theories, convergence and analytic theory, Padé approximants, extensions and applications.

All important aspects and applications of the theory of continued fractions are thus at least touched upon. The area most thoroughly covered is that of continued fraction approximation to power series, in particular, Padé approximation.

Appended to the text are two impressive bibliographies. The first consists of 2302 items which contain "almost all" contributions to the theory of continued fractions up to 1939. There are at least two instances (von Koch, Śleszyński) where a certain article is listed twice. Also Worpitzky's article of 1862 is missing.

A compilation extending to 1988 was recently published by the same author [1].

The second bibliography has 478 entries and lists books and articles containing historical material. There are also indexes of collected works, names, and subjects.

The information gathered by Brezinski is impressive and very useful to people interested in the field. Unfortunately, the author, at least in the reviewer's opinion, misjudges the English-speaking readers' ability to read French. Thus the inclusion of a large number of quotations (some of them several pages long) in French appears to be of little use to the average reader.

There are the usual typographical errors and some factual errors. Thus, Śleszyński in 1888 proved the criterion

$$K(a_n/b_n) \quad \text{converges if for all } n \geq 1, \quad |b_n| \geq |a_n| + 1.$$

The author (p. 189) (as have many mathematicians before him) credits Pringsheim (1898) with the result.

In 1917 Schur initiated a study of functions bounded in the unit disk. One of his main tools was a "continued-fraction-like" algorithm. Brezinski (p. 306) states that he used a certain continued fraction (which essentially appears to be due to Hamel). The approach used by Schur is credited (p. 290) to R. Nevanlinna.

W. J. Thron

Department of Mathematics
University of Colorado at Boulder
Boulder, CO 80309-0426

1. C. Brezinski, *A bibliography on continued fractions, Padé approximation, sequence transformation and related subjects*, Prensas Universitarias, Zaragoza, 1991.

3a [65–00, 65–04].—William H. Press, Saul A. Teukolsky, William T. Vetterling & Brian P. Flannery, *Numerical Recipes in Fortran: The Art of Scientific Computing*, 2nd ed., Cambridge Univ. Press, Cambridge, 1992, xxvi+963 pp., 25 cm. Price $49.95.

3b [65–00, 65–04].—William H. Press, Saul A. Teukolsky, William T. Vetterling & Brian P. Flannery, *Numerical Recipes in C: The Art of Scientific*

Computing, 2nd ed., Cambridge Univ. Press, Cambridge, 1992, xxvi+994 pp., 25 cm. Price $49.95.

The first edition of these widely known volumes has been reviewed respectively in [2, 3]. Virtually every chapter in the present edition has undergone reorganization or expansion, in text as well as in computer routines, reflecting newer developments in methodology and omissions in the first edition. The major addition is a new chapter on integral equations, inverse problems, and regularization. (Surprisingly, there is no reference to [1].) All in all, more than 100 new routines have been added, almost all of the old ones still being there, though often with improved codes. To compensate for this substantial growth in material, many topics deemed "advanced" are now set in smaller type. Even so, the volumes have swelled to nearly 1000 pages, from the original 700–800 pages.

W. G.

1. C. T. H. Baker, *The numerical treatment of integral equations*, Clarendon Press, Oxford, 1977.
2. F. N. Fritsch, Review **3**, Math. Comp. **50** (1988), 346–348.
3. W. Gautschi, Review **6**, Math. Comp. **52** (1989), 253.

4[65–01].—Kendall Atkinson, *Elementary Numerical Analysis*, 2nd ed., Wiley, New York, 1993, xiv+425 pp., 24 cm. Price $61.95.

For a review of the first edition, see [1]. In the present edition, the outlay and character of the text have remained the same. Three paragraphs have been added, one on the general fixed-point method for a single equation, and one each on iterative methods for solving systems of linear, respectively nonlinear, equations. Some other parts of the text have been rewritten and supplied with new examples and problems.

W. G.

1. M. Minkoff, Review **36**, Math. Comp. **47** (1986), 749.

5[68–06, 68Q40, 68U99].—Andreas Griewank & George F. Corliss (Editors), *Automatic Differentiation of Algorithms: Theory, Implementation, and Application*, SIAM Proceedings Series, Society for Industrial and Applied Mathematics, Philadelphia, 1991, xiv+353 pp., 25 $\frac{1}{2}$ cm. Price: Softcover $48.50.

Since 1981, when L. Rall's Lecture Note Volume on Automatic Differentiation appeared, efforts directed toward the design and implementation of automatic differentiation software have multiplied. Nevertheless, the awareness among computational scientists of the availability and use of these tools is still rather restricted, even though their potential applicability is almost unlimited. This has been largely due to the fact that no comprehensive presentation of this subject has been available. The volume compiled and edited by A. Griewank