introduction into theoretical and practical aspects of the use of multigrid methods for the numerical solution of Fredholm integral equations of the second kind. Furthermore, it presents interesting applications to problems in fluid dynamics: the computation of the double layer distribution representing a potential flow around an airfoil, and the computation of the periodic flow generated by an infinite disk performing rotational oscillations.

After introductory remarks and a survey of the compactness results on sequences of approximations to Fredholm operators, the multigrid approach is introduced and asymptotic results about contraction rates, convergence and number of operations are derived and experimentally verified. Then a code is presented (in Algol 68) for the solution of Fredholm integral equations of the second kind. The approximations may be piecewise linear and trapezoidal rule, or cubic spline and Simpson's rule. A tolerance for the remaining discretization error may be specified and the code attempts to choose the finest grid accordingly. In numerical examples the code proves superior to Atkinson's IESIMP.

The second half of the monograph deals with two applications in fluid dynamics. First, the multigrid approach is applied to the numerical solution of the customary collocation system for a piecewise constant doublet distribution along the boundary. A clever analysis of many theoretical and algorithmic details leads to convergence results for the doublet distribution and its derivative and to contraction rates of various multigrid processes. The application to both noncirculatory and circulatory potential flows around Karman-Trefftz airfoils is demonstrated; the circulatory flows require a special type of smoothing and convergence cannot be established in a vicinity of the trailing edge.

A particularly interesting application to the computation of the periodic solution of a parabolic equation with periodic initial conditions concludes the treatise, which constitutes a welcome contribution to the multigrid literature.

H. J. S.

8[10A25, 10-04].—JOHN BRILLHART, D. H. LEHMER, J. L. SELFRIDGE, BRYANT TUCKERMAN & S. S. WAGSTAFF, JR., *Factorizations of* $b^n \pm 1$, $b = 2, 3, 5, 6, 7, 10, 11, 12$ *up to high powers*, Contemporary Mathematics, Vol. 22, Amer. Math. Soc., Providence, R.I., 1983, lxvii + 178 pp., 25 cm. Price $22.00.

The purpose of this volume is to present several tables of factorizations of integers of the form $b^n \pm 1$. The first set of four tables gives the complete (with a few exceptions) factorization of all integers of the form $2^n - 1$, $2^n + 1$, $10^n - 1$, $10^n + 1$ for values of n up to 250, 238, 82, and 72, respectively. A second, larger set of tables presents factorizations of $b^n \pm 1$ for all $n \leqslant m$, where the values of b and m are set out in the table below.

N	m	N	m
$2^n \pm 1$	1200	$7^n \pm 1$	180
$3^n \pm 1$	330	$10^n \pm 1$	150
$5^n \pm 1$	210	$11^n \pm 1$	135
$6^n \pm 1$	195	$12^n \pm 1$	135

These main tables employ a more concise format than the earlier tables; however, the manner in which they are to be used is carefully explained.

There are also three appendices to the main tables. The first contains the actual decimal digits of all prime and probable prime factors in the main table that exceed 25 digits. The second supplies a short summary of the proof of primality of each prime between 25 and 72 digits. As the authors were not able to completely factor several of the numbers in their tables, they present, in the third appendix, the decimal digits of each composite cofactor which is no more than 64 digits.

The authors also provide a chapter on the developments in technology that have permitted them to complete this work. This is a fascinating blend of history, computing and the theory of factorization and primality testing. Unfortunately, the book was sent to press previous to two exciting new developments in this subject. The first of these is the primality test of Cohen and Lenstra (developed from the important work of Adelman, Pomerance, and Rumely), which will undoubtedly provide primality proofs for all the probable primes in the first appendix. The second is the implementation of the Quadratic Sieve Factoring technique by Davis and Holdridge. Indeed, activity in this subject is so great that the 10 "most wanted" factorizations listed by the authors have already been achieved, most of them by Davis and Holdridge.

A very useful feature of this work, especially in view of the intense activity mentioned above, is the provision of periodic updates, which will fit in a pocket in the back cover. One of these appears with the book now and another is to come very soon; still others are expected to follow.

This remarkable book, the product of decades of work, is indispensable to anyone who is interested in the problems of factoring and primality testing. It should be especially enlightening to those individuals who believe that nobody did any "serious factoring" previous to the last ten or fifteen years.

H. C. W.

9[65–06].—DAVID F. GRIFFITHS (Editor), *Numerical Analysis*, Lecture Notes in Math., Vol. 1066, Springer-Verlag, Berlin, 1984, ix + 275 pp., 24 cm. Price $14.00.

These are the proceedings of the 10th biennial conference on Numerical Analysis, held at Dundee June 28–July 1, 1983, containing 15 of the invited lectures. Among the subject areas represented are spline approximation, nonlinear equations and optimization, ordinary and partial differential equations, and weakly singular integral equations.

W. G.

10[41–02].—C. K. CHUI, L. L. SCHUMAKER & J. D. WARD (Editors), *Approximation Theory IV*, Academic Press, New York, 1983, xvii + 785 pp., $23\frac{1}{2}$ cm. Price $50.00.

This volume contains seven survey papers (289 pages) and 74 short research papers (447 pages) given at an international symposium on Approximation Theory held on the campus of Texas A & M University at College Station January 10–14,