results for nonlinear problems and the behavior of solutions when $t \to \infty$.

The main new contribution of the book is contained in Chapter 4. Mixed initial boundary value problems are treated first for problems with constant coefficients in a halfspace and then for the case of variable coefficients in a general cylindrical domain.

The two appendices discuss the well-posedness of more general parabolic equations and another class of initial-value problems.

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8 [5].—A. R. MITCHELL, *Computational Methods in Partial Differential Equations*, John Wiley & Sons Ltd., Aberdeen, 1969, xiii + 255 pp., 23 cm. Price $11.00.

This book is concerned with the numerical solution of partial differential equations by finite-difference methods. There are six chapters: a review of basic linear algebra; parabolic equations; elliptic equations; hyperbolic systems; hyperbolic equations of second order; applications in fluid mechanics and elasticity. Basically, two classes of problems are considered. One class involves elliptic equations for bounded regions, together with various types of boundary conditions. These lead to systems of linear algebraic equations. The other class of problems involves parabolic or hyperbolic equations. There is a time variable, t, as well as one or more space variables. The desired function satisfies prescribed conditions in a region of the space variables for $t = 0$, and also on the boundary of the region for $t \geqq 0$. Such problems can sometimes be solved stepwise with respect to time by explicit methods. However, considerations of stability and accuracy often make the use of implicit methods desirable. With implicit methods one is faced with the solution of a system of linear algebraic equations at each time step.

In the case of parabolic problems the Crank-Nicolson implicit method is often used. In the case of one space variable, the method can be carried out by solving a tridiagonal system. However, in the case of two space variables, one must solve a more general linear system. One method for doing this is to use the successive over-relaxation method (S. O. R. method) which is analyzed in detail. The author states that the analysis carries over directly to elliptic problems, but does not give the details, particularly concerning the choice of the relaxation factor. Another class of methods considered includes various alternating direction implicit methods (A.D.I. methods) including the Peaceman-Rachford method, the Douglas-Rachford method, D'yakonov's method, and others. These methods are used for parabolic, elliptic, and hyperbolic problems. Still another class of methods, called "locally one-dimensional methods" (L.O.D. methods) are considered. These methods were developed primarily by Russian authors including D'yakonov and others, and the author's treatment appears to be one of the first accounts given in a textbook written in English. Explicit and implicit L.O.D. methods are used for parabolic, elliptic, and hyperbolic problems. Other methods used include the use of "split operators" and "locally A.D.I. methods," both of which are applied to hyperbolic problems.

For parabolic and hyperbolic problems, the question of stability is studied using the von Neumann method, which is based on a harmonic decomposition of the error. Other methods used for stability analysis include a matrix method for parabolic problems and a method due to Courant, Friedrichs, and Lewy for hyperbolic problems.

The author states that the book is aimed at science and engineering students in the second or third year of their undergraduate studies. No specialized knowledge of mathematics is assumed beyond undergraduate courses in calculus and in matrix theory. In particular, a knowledge of the theory of partial differential equations is not assumed. It seems, however, that in this country the book would be more appropriate for a student at a more advanced level with a good first course in numerical analysis.

The book is clearly written and provides a good introduction to the subject. However, probably because of the attempt to treat a large amount of material in a short space, certain criticisms are perhaps inevitable. First, there are so many methods presented that the reader is likely to become confused. It might have been better to have presented fewer methods and given more comparative evaluations and numerical results. More discussion of iterative methods for solving large linear systems would have been helpful—for instance, semi-iterative methods. Also, the treatment of the S.O.R. method for elliptic problems is very brief; in particular, there is very little discussion on the use of the method in practical cases. Only a very limited class of hyperbolic equations are considered. These involve regions with boundaries parallel to a coordinate axis. Also, a brief summary of the properties of characteristics would have been helpful. For elliptic equations some mention of the existing knowledge of discretization errors (e.g., Gershogrin's results and more recent work) would seem appropriate. Finally, it should be mentioned that the chapter on linear algebra has some errors (for example, it is stated that if two matrices have the same eigenvalues then they are similar).

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9 [7].—L. S. Bark, N. I. Dmitrieva, L. N. Zakhar'ev & A. A. Lemanskiĭ, *Tablitsy Sobstvennykh Znacheniĭ Uravneniia Mat'e* (*Tables of Characteristic Values of the Mathieu Equation*), Computing Center, Acad. Sci. USSR, Moscow, 1970, xi + 151 pp., 27 cm. Price 1.81 rubles.

For the Mathieu equation in the canonical form $d^2y/dx^2 + (p - 2q \cos 2x)y = 0$, these tables give to 7S (in floating-point form) the characteristic values for both the even and odd periodic solutions, for a more extensive range of the parameter q than heretofore.

More explicitly, the first table (pp. 3–86) contains the characteristic values a_{2n}, a_{2n+1} (associated with the even periodic solution) for $n = 0(1)15$ and $q = 0.1(0.1)100$. A continuation of this table (pp. 87–111) gives these characteristic