dimensional associative algebras and for finite-dimensional Lie algebras of characteristic zero. A second introductory chapter explains some basic concepts applying to arbitrary non-associative algebras; the associative and Lie multiplication algebras, trace forms and bimodules are discussed here. The three remaining chapters, forming the body of the book, deal with alternative algebras (presented in some detail), Jordan algebras and power-associative algebras. The exceptional simple Lie algebras are introduced *en passant* as derivation algebras of alternative and Jordan algebras.

This is a very useful addition to the literature and a good preparation for more specialized books. The author succeeds in keeping the level elementary and in assisting the reader to view the subject as a whole in perspective.

I. M. H. ETHERINGTON

HILDEBRAND, FRANCIS B., *Finite Difference Equations and Simulations* (Prentice Hall, 1968), ix+338 pp., 119s. 6d.

This book gives a useful account of the properties and solution of finite difference equations, and their application to the numerical solution of both ordinary and partial differential equations. It is therefore unfortunate that the title does not adequately describe the contents.

Only a basic knowledge of numerical work is assumed, such as that usually given in an elementary computer programming course, and although there is no emphasis on computers as such, the bias of the book is towards methods applicable to digital computers. It is assured however that the reader is familiar with the numerical methods of linear algebra and with the mathematical treatment of differential equations.

The book contains three approximately equal chapters. In the first, by introducing the theory of finite difference operators and drawing heavily on a knowledge of the solution of ordinary differential equations, the solution of finite difference equations is discussed, to more depth than is usual in a book of this kind. Most of the work is concerned with linear equations with constant coefficients, including both eigenvalue and boundary value problems, but there is some treatment of the general first order equation.

In the second chapter, the relationship of the differential operator to the difference operator is established, and this serves to introduce the numerical treatment of ordinary differential equations. Subsequently the standard numerical methods are presented and analysed for first and higher order equation, together with an adequate and satisfactory account of stability aspects. Finally, there is some treatment of boundary value and eigenvalue problems and some estimates of error bounds.

In the last chapter, on partial differential equations; the author concentrates exclusively on those of the second order, and therefore first gives their classification. This is followed by a discussion of the solution of the heat conduction equation by both explicit and implicit methods. These ideas are then applied to some non-linear parabolic equations and also briefly to the hyperbolic wave equation with appropriate emphasis on the different aspects of stability. There is a description of the methods of characteristics for the general solution of hyperbolic equations including two simultaneous first order equations. This chapter closes with a brief account of the Dirichlet problem for Poisson's equation, including curved boundaries, but with little discussion of the convergence of the various iterative methods.

The book is adequately provided with examples, and achieves a commendable balance between numerical results and theoretical aspects. It is therefore to be recommended as a first text book on this subject, particularly for students who have studied mathematics, and probably requires supplementation only in the field of partial differential equations.

D. C. GILLES