

7[P, Q, S, X, Z].—R. E. BELLMAN & R. E. KALABA, *Quasilinearization & Nonlinear Boundary-Value Problems*, Vol. 3, American Elsevier Publishing Co., New York, ix + 206 pp., 24 cm. Price \$8.50.

In this book a number of nonlinear boundary value problems are discussed, using analytic and numerical methods. Various applications—like a control problem, an inverse problem in radiation transfer theory and even in cardiology—are considered, but clearly the methods dominate the applications to these problems. The methods which the authors apply mainly consist of approximating the solution of the nonlinear problems by solving successively a sequence of linear problems as in the case of the well-known Newton-Raphson method. This approach is explained in very simple terms in the initial chapter and it is observed that for a number of problems the monotonicity of the approximating sequence can be insured and used for convergence proofs. The linear equations which one is led to are then treated by various numerical methods. The authors emphasize that this approach—which they call “quasilinearization”—is not the same as the Newton-Raphson method, but in all cases treated, the methods seem to be identical and the subtle distinction remained unclear to the reviewer. The main part of the book is restricted to boundary value problems for ordinary differential equations and a brief chapter is devoted to partial differential equations.

The book does not require a strong background in mathematics or numerical analysis. It is written in a fluent and informal style. However, while simple concepts and ideas are explained very clearly, the uninformed reader will be stopped by terms like dynamic programming, invariant imbedding techniques, which are not at all explained but frequently used in a casual manner. For example, on p. 52, one finds a derivation of the Hamilton-Jacobi equations for a simple example, however, reference is made to dynamic programming, but not to Hamilton-Jacobi. This is certainly misleading.

To sum up: This book contains an informal—not so informative—approach to some nonlinear boundary value problems with a variety of applications which are discussed briefly and supplied with computer programs.

JÜRGEN MOSER

New York University
Courant Institute of Mathematical Sciences
New York, New York 10012

8[P, S, X].—LOUIS A. PIPES, *Operational Methods in Nonlinear Mechanics*, Dover Publications, New York, 1965, viii + 99 pp. 22 cm. Price \$1.50.

Perturbation and iteration procedures are frequently employed to obtain approximate solutions of nonlinear vibration problems. Thus the nonlinear problem is replaced by a sequence of linear problems. In this book, the Laplace transform method is applied to solve the resulting linear problems. The author claims that this method reduces the algebraic labor involved in obtaining solutions. It is applied to a variety of problems most of which arise in circuit theory and are of nonautonomous type.

The purposes of the book are best described by quoting from the Introduction: “. . . the object of . . . this book (is) to present some useful methods for the solution of certain classes of important nonlinear technical problems in a manner available