32[P, X].—R. E. D. BISHOP, G. M. L. GLADWELL & S. MICHAELSON, *The Matrix Analysis of Vibration*, Cambridge University Press, New York, 1965, x + 404 pp., 26 cm. Price $19.50.

It is stated in the preface that this book "can be regarded as a sequel to an earlier volume" [R. E. D. Bishop & D. C. Johnson, *The Mechanics of Vibration*, Cambridge University Press, 1960], but that it can be read independently. Four of the chapters deal mainly with the mathematical formulation, in matrix form, of vibration. These are Chapter 2, The Vibration of Conservative Systems having a Finite Number of Degrees of Freedom; Chapter 4, Further Development of the Theory of Conservative Systems; Chapter 5, Damped Forced Vibration; and Chapter 6, Continuous Systems. The remaining five chapters can be read independently of these, and two provide a very elementary introduction to the theory of matrices, while the remaining three provide equally elementary descriptions of computational techniques.

For solving linear systems and inverting matrices, only methods of triangular factorization are discussed (Gaussian elimination with pivoting). Chapter 8 deals mainly with the power method for finding the root, with Aitken's acceleration, deflation, and some techniques for finding error bounds based mainly on the use of the Rayleigh quotient. The use of a Rayleigh-quotient iteration is implied, and could be so easily developed, that one wonders why it was not. The final chapter bears the slightly misleading (but often used) title "Direct Methods for Characteristic Values." The direct methods, of course, produce only a reduced matrix or the characteristic equation, to which it is still necessary to apply some iterative method. For symmetric matrices they choose the method that goes by the name of the reviewer; for nonsymmetric matrices they describe the Lanczos method. For the triple-diagonal matrices, they discuss Newton's method and Muller's method.

There are many exercises, and about 30 pages of detailed solutions at the end. In addition, a number of illustrative examples are worked out in the text. The complete novice to matrix theory, even if also a novice to vibration theory, should have little difficulty in reading the matrix chapters on his own and getting a limited but good introduction to the theory and to the computational techniques.

A. S. H.

33[P, X].—C. T. LEONDES, Editor, *Advances in Control Systems, Theory and Applications*, Academic Press, Inc., New York, 1964, x + 365 p., 24 cm. Price $13.00.

This is the first of a series the purpose of which is "to disseminate current information from leading researchers in the ever broadening field of automatic control." It is to consist of a collection of "critical and definitive reviews" at a level between a journal and a monograph covering both theory and applications.

Volume I contains six contributions:

1. "On optimal and suboptimal policies in control systems," by Masano Aoki (pp. 1–53). The control system is disturbed by random noise. If the distribution function of the noise is known, it is called a "stochastic" control problem. If less information is given, it is called an "adaptive" control problem. A review is given of the linear theory of such systems.