One section of the investigation applies general results from nonlinear vibration theory to the Van der Pol equation. Another section develops a perturbational technique to obtain approximations to periodic solutions.

The final section discusses analogue computer techniques to generate solutions of the equation.

PAUL BROCK

The RAND Corporation
Santa Monica, California

83[M, S].—L. C. WALTERS & J. R. WAIT, *Computation of a Modified Fresnel Integral Arising in the Theory of Diffraction by a Variable Screen*, National Bureau of Standards Technical Note 224, U. S. Government Printing Office, Washington, D. C., October 1964, iii + 20 pp., 27 cm. Price $0.20.

This report contains numerical tables of the real and imaginary parts of the diffraction integral

$$F = \int_{-\infty}^{\infty} f(z) \exp(-i\pi z^2/2)\, dz$$

in the following three cases:

I. Linear tapered aperture,

$$\begin{aligned} f(z) &= \frac{1}{2} + \frac{\beta}{2}(z - z_0), && z_0 - \beta^{-1} \leqq z \leqq z_0 + \beta^{-1}, \\ &= 0, && -\infty \leqq z \leqq z_0 - \beta^{-1}, \\ &= 1, && z_0 + \beta^{-1} \leqq z. \end{aligned}$$

II. Cubic tapered aperture,

$$\begin{aligned} f(z) &= \frac{1}{2} + \frac{\beta}{2}(z - z_0) - \frac{2\beta^3}{27}(z - z_0)^3, && z_0 - \frac{3}{2\beta} \leqq z \leqq z_0 + \frac{3}{2\beta}, \\ &= 0, && -\infty \leqq z \leqq z_0 - \frac{3}{2\beta}, \\ &= 1, && z_0 + \frac{3}{2\beta} \leqq z. \end{aligned}$$

III. Exponential tapered aperture,

$$f(z) = \{1 + \exp[-2\beta(z - z_0)]\}^{-1}, \qquad -\infty \leqq z \leqq \infty.$$

In Tables 1 and 2, associated with Cases I and II, respectively, the integral F is tabulated to 5D for $\beta = 0.2, 0.5, 1, 2, 5, 10$, and $z_0 = 0(0.1)5$. Table 3, associated with Case III, consists of 5D approximations to F for $\beta = 0.5, 1, 2(0.5)3(1)5, 10, \infty$, and $z_0 = 0(0.1)5$.

The authors note that, in all three cases, as β tends to infinity, F approaches $\frac{1}{2}(1 - i) - F_0(z_0)$, where $F_0(z) = \int_0^z \exp(-i\pi x^2/2)\, dx$ is the Fresnel integral. This fact permitted a check on the entries in Table 3 corresponding to $\beta = \infty$, through a comparison with the corresponding data in the tables of Wijngaarden and Scheen [1]. Complete agreement was found.

The authors state that these tables have been designed for use in the numerical solution of diffraction or scattering problems involving objects with tapered distributions of density.

J. W. W.

1. A. VAN WIJNGAARDEN & W. L. SCHEEN, *Table of Fresnel Integrals*, Report R49, Computation Department of the Mathematical Centre, Amsterdam, 1949.

84[P, X].—ARTHUR G. HANSEN, *Similarity Analyses of Boundary Value Problems in Engineering*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1964, xiv + 114 pp., 24 cm. Price $6.75.

This informal monograph presents a comparative discussion of four related approaches to finding self-similar solutions to boundary-value problems in engineering. These approaches are called the "free parameter" method (Riabouchinsky's method), "separation of variables" (reference is made to D. E. Abbott and S. J. Kline), "group-theory methods" (developed by A. J. A. Morgan, following ideas of the reviewer), and (lastly!) "dimensional analysis" (following L. I. Sedov).

A modest mathematical background is assumed; for instance, the notion of a group of transformations is explained carefully. Physical, philosophical, and experimental questions are avoided; the emphasis is on working out in detail solutions to specific boundary-value problems, some of which have been published only recently in the periodical literature on fluid flow and heat transfer.

Though in no sense profound, the book should be helpful in introducing various recent extensions of Rayleigh's "method of similitude" to wider circles of mathematically-minded scientists.

GARRETT BIRKHOFF

Harvard University
Cambridge, Massachusetts

85[P, X, Z].—M. L. JAMES, G. M. SMITH & J. C. WOLFORD, *Analog and Digital Computer Methods in Engineering Analysis*, International Textbook Company, Scranton, Pennsylvania, 1964, x + 457 pp., 24 cm. Price $9.25.

This is one of the few books which presents a balanced approach to both analog and digital computing as used in engineering at the elementary level; the more imaginative and exciting uses are simply ignored. Thus, it is a good, solid, pedestrian text for a beginning computing course in engineering.

The first chapter, entitled Basic Analog-Computer Theory, covers the pertinent electronics sufficiently to make the operation clear and avoids getting mired in details. It goes on to show, by many clear examples, how to use the computer to solve practical problems.

The second chapter, Simulation of Discontinuous and Nonlinear Physical Systems, supplies all necessary details.

The third chapter, The Role of Analog Computers in Engineering Analysis, is a very good one, as it makes its points very well.

Chapter 4, The Digital Computer and the FORTRAN System, is simply an introduction to FORTRAN.

Chapter 5, Numerical Methods for Use with the Digital Computer, covers finding zeros, solution of simultaneous linear equations, eigenvalues, integration, differ-