14[L, M].—K. A. Karpov, *Tablitsy funktsiĭ* $F(z) = \int_0^z e^{x^2} dx$ *v kompleksnoĭ oblasti* (*Tables of the function* $F(z) = \int_0^z e^{x^2} dx$ *in the complex domain*), Izdatel'stvo Akademii Nauk SSSR, Moscow, 1958, 518 p. + 2 inserts, 27 cm. Price 61 rubles.

This is a companion volume to the tables reviewed in *MTAC*, vol. 12, p. 304–305, and completes the tabulation of the error function in the complex plane. The present volume contains 5D or 5S values of the real and imaginary parts of the function

$$F(z) = \int_0^z e^{x^2} dx = u + iv$$

for $z = \rho e^{i\theta}$, $0 \leqq \rho \leqq \rho_0$, $\pi/4 \leqq \theta \leqq \pi/2$ and $\theta = 0$. The quantity ρ_0 depends on θ and decreases from $\rho_0 = 5$ for $\theta = \pi/4$ to $\rho_0 = 3$ for $\theta = \pi/2$. An exception is $\theta = 0$, for which $\rho_0 = 10$. In the introduction, a diagram is given representing the intervals in θ and the value of ρ_0 for each θ, and a table indicates the intervals in ρ in various parts of the volume. As in the earlier volume, the diagram is reproduced on a cardboard inset, which serves also as an index to the numerical tables.

The introduction gives integral representations and series expansions for u and v, graphs of u and v as functions of ρ for selected values of θ, relief diagrams of u and v over the sector of tabulation, a description of the tables and numerical examples showing their use, some useful numerical values, values of cos 2θ, sin 2θ, and values of $(2n + 1)\theta$ in radians for $n = 0(1)5$ and for those values of θ included in the tables. There is also a one-page auxiliary table of $t(1 - t)/4$ for $0 \leqq t \leqq 1$. This table, together with a nomogram for finding $\tilde{\Delta}^2 t(1 - t)/4$, where $\tilde{\Delta}^2$ designates the sum of two consecutive second differences for use in Bessel's interpolation formula, is reproduced also on a cardboard inset.

Using the symmetry properties of $F(z)$, this function can now be evaluated on the real axis and in a sector of half-angle 45° to both sides of the imaginary axis. Between them, Karpov's two volumes contain a very satisfactory tabulation of the error function in the complex plane.

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15[L, M, S].—Y. Nomura & S. Katsura, "Diffraction of electric waves by circular plate and circular hole," Sci. Rep. Ritu, B-(Elect. Comm.) *10*, No. 1, 1958, 43 p.

The problem of the diffraction of a plane electromagnetic wave by an infinitely thin, perfectly conducting, circular disk of radius a, and the problem of the diffraction of such a wave by a circular hole of radius a in a plane conducting screen are discussed. The method of solution involves the expansion of the two-component Hertz vector in terms of hypergeometric polynomials. The solution is valid for all frequencies. However, convergence is poor when $ka = 2\pi a/\lambda$ becomes large. Tables of values are included of the real and imaginary parts of

$$G_{n\nu}^m = (2m + 4\nu + 1) \int_0^\infty \frac{J_{m+2n+\frac{1}{2}}(\xi) J_{m+2\nu+\frac{1}{2}}(\xi)\, d\xi}{\sqrt{\xi^2 - (ka)^2}}$$

for $m = 0(1)4$, $n, \nu = 0(1)5$, and $ka = 0(.25)5$, where $J_p(\xi)$ is the Bessel function of the first kind of order p. The function $X^m_{\nu s}$ is defined in terms of the equations

$$\sum_{\nu=0}^{\infty} G^m_{\nu n} X^m_{\nu s} = \delta_{sn}.$$

Tables for $X^m_{n\nu}$ for $n = 0(1)4$, $\nu = 0(1)2, 5$, $m = 0(1)4$, over the same range of ξ, are also included.

In addition, tables are given which are useful for the calculation of the field distribution at large distances, and tables are given which enable one to determine the current distribution on the plate and the electric field distribution on the whole.

All table entries are given to four decimal places. However, no indication is given as to the numerical method of evaluating the table entries nor as to their actual accuracy.

A. H. T.

16[P].—CHARLES J. THORNE, *Temperature Tables: Part 1. One-Layer Plate, One-Space Variable, Linear*, NAVORD Report 5562, U. S. Naval Ordnance Test Station, California, 1957, iv + 711 p., 28 cm.

This table is concerned with listing the solution of the heat conduction equation in a plate of finite thickness, with heat transfer at both faces. In mathematical form

$$\begin{array}{lll} U_{XX} = kU_t & 0 < X < L, & t > 0 \\ KU_X = -h_i(U_i - U) & X = 0, & t > 0 \\ KU_X = -h_0(U - U_0) & X = L, & t > 0 \\ U = U_0 & t = 0, & 0 < X < L \end{array}$$

where the conductivity K, density ρ, specific heat c, diffusivity $h = c\rho/K$, heat transfer coefficients h_i and h_0, and stagnation temperatures U_i and U_0 are assumed to be constant. L is the plate thickness, x is the distance, and t is the time. For the tables a dimensionless system of variables is adopted, i.e., $x = X/L$, $kL^2\tau = t$, $u = (U - U_0)(U_i - U_0)$, $\alpha_0 = h_0L/K$, $\alpha_i = h_iL/K$. Then the above problem becomes

$$\begin{array}{lll} u_{xx} = u_\tau & 0 < x < 1, & \tau > 0 \\ u_x = -\alpha_i(1 - u) & x = 0, & \tau > 0 \\ u_x = -\alpha_0 u & x = 1, & \tau > 0 \\ u = 0 & \tau = 0, & 0 < x < 1 \end{array}$$

The analytical solution of this problem is

$$u(x, \tau) = 1 - \frac{\alpha_0(1 + \alpha_i x)}{\alpha_0 + \alpha_i + \alpha_0\alpha_i} + 2\sum_{n=1}^{\infty} \frac{e^{-\beta_n^2\tau}}{\beta_n D'(\beta_n)}$$
$$\cdot \{\alpha_i[\beta_n \sin\beta_n - \alpha_0 \cos\beta_n] \sin\beta_n x + \alpha_i[\beta_n \cos\beta_n + \alpha_0 \sin\beta_n] \cos\beta_n x\},$$

where

$$D'(\beta) = -\beta(2 + \alpha_0 + \alpha_i) \sin\beta + (-\beta^2 + \alpha_0 + \alpha_i + \alpha_0\alpha_i) \cos\beta,$$