Sieben-und mehrstellige Tafeln der Kreis-und Hyperbelfunktionen und deren Produkte sowie der Gammafunktion, nebst einem Anhang: Interpolations- und sonstige Formeln. By Keiichi Hayashi. Berlin, Julius Springer, 1926. vi+283 pp.

In many physical and engineering calculations, the trigonometric functions of an argument expressed in circular measure occur in combination with the hyperbolic functions of the same argument, and it is therefore very convenient to have a table giving both kinds of functions with a single entry. The work under review is far more elaborate and complete than any other tables of this kind. In the main part of Table I, x runs from 0.100 to 2.999 by intervals of 0.001, and the following columns are found on two opposite pages: x, $\phi(=x$ converted into degrees, minutes and seconds), sin x, cos x, tan x, arcsin x, arccos x, arctan x (left page); x, e^x, e^{-x}, sh x, ch x, th x, arg sh x, arg ch x (part of the table only), arg th x (right page). At the bottom of each page there is an additional table giving log nat x and the hyperbolic amplitude ϑ (where $x=\log \text{nat} \tan(\pi/4+\vartheta/2)$). The number of decimal places carried varies with the function tabulated from twelve for sin x and cos x to seven for arg sin x. The beginning of Table I is arranged somewhat differently for reasons of space, and gives the same functions to twenty places from $x=0.00000$ to 0.00100 and to ten places from $x=0.0010$ to 0.0999, the interval being one unit in the last decimal place noted. The end of Table I gives these functions from $x=3.00$ to 9.99, 10.0 to 20.0 and 21 to 50, the number of decimal places varying from 18 to 7.

Table II gives sin $(x\pi/2)$ and cos $(x\pi/2)$ from $x=0.000$ to 0.500 to ten places, and Table III e^{ξ}, $e^{-\xi}$, sh ξ, ch ξ, where $\xi=x\pi/360$, from $x=0$ to 360. Table IV gives the four products (sin, cos) x, (sh, ch)x, which form a fundamental system of the differential equation $d^4y/dx^4+y=0$ and occur, for instance, in the theory of a beam on a continuous elastic support. Tables V and X are the customary conversion tables for angular and circular measure. Table VI gives $\log_{10}\Gamma(x)$ from $x=0$ to 3 with from eight to thirteen places at intervals varying from 0.00001 to 0.01, and Table VII contains $\Gamma(x)$ to seven and eight places from -5 to $+5$ at intervals from 0.001 to 0.01. Table VIII gives the first ten powers of the integers from 1 to 100, Table IX the first 30 powers of 2, 3, 4 and 5, while finally Table XI contains factorials, their inverses, and some other series coefficients. There is an appendix, giving the main formulas for hyperbolic functions, general notes on interpolation, and special devices, with auxiliary tables, to facilitate interpolation in the main table.

One cannot but admire the author's fortitude in carrying on his work in the face of disaster. As he tells us in the preface, the manuscript of over a thousand pages was completed toward the end of 1923, only to be destroyed in a fire that consumed the engineering building of the University of Kyushu. The author immediately began his work anew, and in another two years completed the manuscript of the present tables which will certainly remain the standard of their kind for many years to come.

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