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Graphical and Mechanical Computation. By J. LIPKA. New York, Wiley, 1918. 9 + 264 pp. + 2 scales in pocket. Price $4.00.

Contents—I: Scales and the slide rule, 1–19. II: Network of scales; charts for equations in two and three variables, 20–43. III–V: Nomographic or alignment charts, 44–119. VI: Empirical formulas—non-periodic curves, 120–169. VII: Empirical formulas—periodic curves, 170–208. VIII: Interpolation, 209–223. IX: Approximate integration and differentiation, 224–259.

Extract from the Preface—"This book embodies a course given by the writer for a number of years in the Mathematical Laboratory of the Massachusetts Institute of Technology. It is designed as an aid in the solution of a large number of problems which the engineer, as well as the student of engineering, meets in his work. . . .

"Engineers have recognized for a long time the value of graphical charts in lessening the labor of computation. Among the charts devised none are so rapidly constructed nor so easily read as the charts of the alignment or nomographic type—a type which has been most fully developed by Professor M. d'Ocagne of Paris. Chapters III, IV, and V aim to give a systematic development of the construction of alignment charts; the methods are fully illustrated by charts for a large number of well-known engineering formulas. It is the writer's hope that the simple mathematical treatment employed in these chapters will serve to make the engineering profession more widely acquainted with this time and labor-saving device.[1]

"Many formulas in the engineering sciences are empirical, and the value of many scientific and technical investigations is enhanced by the discovery of the laws connecting the results. . . . Chapter VII considers the case where the data are periodic, as in alternating currents and voltages, sound waves, etc. and gives numerical, graphical, and mechanical methods for determining the constants in the equation.

"When empirical formulas cannot be fitted to the experimental data, these data may still be efficiently handled for purposes of further computation,—interpolation, differentiation, and integration,—by the numerical, graphical, and mechanical methods developed in the last two chapters.

"Numerous illustrative examples are worked throughout the text, and a large number of exercises for the student is given at the end of each chapter. The additional charts at the back of the book will serve as an aid in the construction of alignment charts. Bibliographical references will be found in the footnotes.

"The writer . . . owes the idea of a Mathematical Laboratory to Professor E. T. Whittaker of the University of Edinburgh."

[1] The second edition, revised and corrected, of D'Ocagne's *Calcul graphique et nomographie* (Paris, O. Doin, 1914), contains an interesting and extensive bibliography down to the year 1912 (pages 381–386). Among eighteenth century items are: (1) L. Pouchet, "Arithmétique linéaire" appendix to *Echelles graphiques des nouveaux poids, mesures*, Rouen, 1795; and (2) J. von Segner, "Methodus simplex et universalis omnes omnium æquationum radices detegendi," *Acad. Petrop. Novi Comment.*, tome 7, 1761. E. V. HUNTINGTON briefly discusses nomography on pages 178–185 of his *Handbook of mathematics for engineers* (1918) which is reprinted from L. S. Marks's *Mechanical Engineer's Handbook* (New York, 1916). For an application of nomography to the geological problem of finding faults, see "The faultless faultfinder" by W. S. Weeks and E. V. Huntington, *Engineering and Mining Journal*, August 15, 1914.