

*Die Differentialgleichungen des Ingenieurs.* By W. Hort. Second edition. Berlin. Julius Springer, 1925. 12+700 pp.

The first edition of this book appeared in 1914 and was reviewed in this BULLETIN, vol. 23, p. 379. Since general conditions have been approximately normal, the first edition has been exhausted with unusual rapidity for a book of such specialized character. Apparently the author has succeeded in filling a need in technical literature.

For the second edition the material has been expanded by a more complete treatment of the methods of numerical approximation for ordinary differential equations and by the addition of a section on the calculus of variations and a section on integral equations.

As the title indicates, the book is written for engineers. The author's point of view is set forth in a quotation from Burkhardt to the effect that the study of technical mathematics should be pursued like the study of a natural science, leaving aside the finer researches and depending upon common sense, technical insight, and experiment to avoid the grosser errors. Accordingly, one finds in this book many technical and physical examples to illustrate the methods of integration, but little consideration of questions regarding the existence of solutions and the convergence of the series employed.

The usual types of ordinary differential equations are taken up and each type is illustrated by a technical application. Considerable space is given to the theory and description of various types of integrating machines, and the best methods of numerical approximation are explained and illustrated. These distinctive features give the book its value to the scientific worker who uses a differential equation as a tool.

The author has not confined himself entirely to technical examples, but has introduced others when the methods employed might be useful in engineering problems. For this reason and because of its general interest a brief study of central forces is followed by a rather complete development of elliptic motion under the newtonian law. A section on linear difference equations is also included.

The study of partial differential equations is confined to the standard equations occurring in mathematical physics. The motion of elastic bodies, problems of hydrodynamics, and an extensive discussion of the potential serve to introduce Bessel's functions and spherical harmonics and to illustrate the methods of finding the solutions.

The usefulness of the book is increased by a very complete index, a list of references to the literature, and a tabulation of the types of equations treated, together with the illustrative examples used under each type.

The mechanical construction of the book is exceptionally good. The type is clear, the figures are carefully made and clearly reproduced, and the quality of paper is very much better than has been commonly used by German printers in recent years.

W. R. LONGLEY