BOOK REVIEW — BUCHBESPRECHUNG

ROBERT SAUER: *Ingenieur Mathematik.* Zweiter Band, Differentialgleichungen und Funktionentheorie, Dritte erweiterte Auflage, Springer, 1968. Berlin, Heidelberg. New York

This is the second volume of a textbook of introductory Engineering Mathematics covering roughly the basic course program of the third and fourth semesters in German technical colleges. (The first volume containing differential and integral calculus of functions of a single and of several real variables covers the first two semesters.)

This volume deals with the following topics. Vector analysis including the presentation of the differential invariants in cylindrial and spherical coordinates. Ordinary differential equations, i.e. the standard introductory chapters on classes of differential equations which can be solved directly by elementary methods of integration, the theory of linear differential equations, etc., with some aspects of graphical and numerical methods of integration, of eigenvalue problems and Fourier series. Classical initial value problems connected with some partial differential equations of mathematical physics. Theory of functions of a complex variable including conformal mapping, the theory of residues, the Schwarz—Christoffel formula and some potential theory.

Emphasis is laid throughout on applications; new concepts and theories are introduced via engineering problems where possible. The book contains a paragraph on the theory of oscillations, a paragraph on applications of complex functions in aerodynamics and electricity. Understanding is made easier by several examples worked out in detail. There is equally great emphasis on the presentation of practical, numerical methods, these being unquestionably the most interesting parts for those who consider Mathematics a working tool. Theoretical refinements, possibilities of generalization of the presented ideas are not dealt with. However, basic theorems are clearly stated in the text and mostly proved in the Appendix. There are several clearly drawn figures in the book helping the beginner to understand the text.

M. FARKAS

L. P. HYVÄRINEN: *Information Theory for System Engineers.* Springer-Verlag. 1968. Berlin—Heidelberg—New York A Lecture Notes in Operations Research and Mathematical Economics, Vol. 5. pp. 205.

This book of nine chapters is built up from the material of lectures delivered by the author for system engineers. The individual chapters are concerned with the following subjects:

Noiseless channels
Coding in case of noiseless channels
Natural languages
Noisy channels
Error checking and error correcting codes
The characteristics of continuous channels
The sensing of continuous signals
Information filters
Appendix for special mathematical problems

The book discusses the usual main questions of information theory explicitly from the view-

point of system engineers. By this, it facilitates better understanding of the nature of the operations of information reception, processing, storing, transmission, etc. In addition to give information about the logical and theoretical fundamentals, its comprehensive method of discussion makes it possible for those who intend to be absorbed into the special field to use it as a basis in their further studies.

An interesting characteristic of the book is that, besides establishing the fundamentals by theoretical mathematical means, it does not forget about satisfying the practical requirements even when discussing this wide subject in a comparatively concise publication. This is achieved mainly by the publication of numerical calculations and by the index to be found at the end of the book.

This publication has brought something new besides the classical and well-known literature of information theory both by the selection of its title and by the treatment of the subject.

G. WESTSIK

HENRI CABANNES: *General Mechanics*. Translated from the second French edition by S P. Sutera, Ginn Blaisdell, 1968.

This book of tasteful, extremely elegant aspect consists of four parts. The first part, occupying about one third of the volume, is concerned with general mechanics proper. After fundamentals of kinematics and kinetics, basic theorems of mechanics are treated, followed by the principle of motion of mass-center, by the moment of momentum theorem and, finally, by the principle of special relativity.

All this knowledge is applied to demonstrate a method for solving problems in dynamics in general, such as motions with constraint, pendulum motion, rotation, collision, friction, resistance, motion of motor cars, etc.

A separate chapter is devoted to the concept of power and work, including that of deformation. The method of virtual power is presented on numerous examples. Another chapter is concerned with the differential equations of mechanics, extending over the theory of vibrations and oscillations. In the chapter on analytical mechanics, quite a range of different problems are solved on the basis of the Lagrange equations.

The two final chapters of the first part demonstrate applications for special cases of particles and of rigid bodies, respectively, involving different subjects, such as, pendulum motion, gyroscope motion, central motion, motion in an electromagnetic field, the two-body problem, problems of astronomy and of artificial satellites, etc.

The second part of the book is concerned with one research domain of the author, in particular the mechanics of fluids, at a bigh level, in up-to-date form, in an extension of about 50 pages.

The third part raises selected problems, four of which, among them the theory of polar auroras, are closely discussed.

The fourth part of a few pages comprises function tables.

The extremely concise treatment of such a vast material on mere 426 pages required a skilful use of vector and tensor calculus. The author is outstanding in precisely creating and deriving concepts, in elucidating modelling possibilities, as well as in raising the reader's interest and pointing out main items of science.

A total of 172 examples are given to help practising; references are plentiful and exact. The presented figures are such as customary in the world literature from engineering aspects, however, they are rather meagre, consisting mostly of a few lines of equal thickness, loosing thereby in illustrative power. Sometimes a few more figures would help understanding and comprehension.

All these deduce nothing of the value of this book, outstanding even from typographical aspects. It is equally useful for physicists and engineers. Certainly, it is not made for primary instruction, but, besides for practising specialists, also for university students it is highly profitable. As to Hungarian specialists, there are more who speak English than French. Therefore, the English version is welcome in this country, too.

T. CHOLNOKY

HEINZ PARKUS: *Thermoelasticity*. Blaisdell Publishing Company, A Division of Ginn and Company, 1968.

The publication of Heinz Parkus' work is an important event in the literature on thermoelasticity. The problems of thermoelasticity have been considered since the middle of the last century (the first important work was published by Duhamel: Mémoire sur les phénomènes thermomécaniques), nevertheless it is only during the last two or three decades that systematic research has been conducted actively. The author took an important part in this research and he summarized some results of the last decade on a scientific level.

The aim of the author was to present, in a relatively small volume, those parts of the science of thermoelasticity which, in his opinion, were of basic importance. In writing the book the author expected the reader to be acquainted with the basic theory of thermoelasticity and to have some knowledge of modern mathematics. The elements of complex function theory will be needed to understand some parts of the book (e.g. Chapter 3).

The book is highly valuable in that solutions of the theoretical problems are illustrated by thoroughly choosed examples at the end of each chapter. These examples can serve as useful bases for further creative work in engineering.

As thermoelasticity covers nonisothermal deformations of bodies, the determination of temperature field of bodies has been treated first, followed by the actual problems of the thermoelasticity.

In Chapters 3 and 4 the problems of thermoelasticity two-dimensional bodies are dealt with, with special regard to the stresses and strains arising in plates, as well as to buckling phenomena. Solutions by real and complex functions are confronted to demonstrate advantages and disadvantages of both. These most important and most extensive chapters are completed by many examples, problems being accompanied by advices how to solve them.

Chapter 5 deals with the general theory of thermoelasticity, with special regard to kinematic relations and stress analysis. Several special cases are considered, subject to significant simplifications, so they are very useful and valuable for the practice. For cases of small deformations fundamental equations are linearized (similarly as for isothermical elasticity) and thereby are solutions simplified.

Chapter 6 is on the propagation of one-dimensional plane waves in a medium conducting heat, as a foundation of the theory of thermoelasticity for deformations due to small and slow temperature changes.

The book can be recommended as graduate supplementary material for one semester in Elasticity.

E. PÁSZTOR