propagation characteristics can be used to obtain information about the samples. Acoustical reflections from tissue interfaces, transit-time measurements of acoustic pulses and ultrasonic absorption properties are indications of various characteristics of the specimens. Some of the authors report on the evaluation of these phenomena in the development of diagnostic techniques for studying heart diseases, tumors, skeletal muscle and various aspects of neurology.

High-intensity ultrasonic waves can change tissue structure at a molecular level. Since these selective changes may introduce modifications or damage in biological systems, possible applications of ultrasound in therapy and surgery are discussed, and well illustrated reports are included on the treatment of tumors and cancer and on the effect of ultrasonic irradiation on the pituitary, mouse livers and other tissue.

In addition to these specific reports the book also contains papers on the physical aspects of sound related to acoustic streaming and cavitation, focusing of acoustic waves, electronic design and transducer construction.

This Symposium report, authored by physicians, physicists, engineers and biologists from seven countries and edited by the Associate Director of Research at the Interscience Research Institute, should be of great value to the biophysicist and those interested in medical physics.

Linear differential equations

HANDBOOK OF LAPLACE TRANSFORMATION. Fundamentals, Applications, Tables and Examples. (2nd ed.) By Floyd E. Nixon. 260 pp. Prentice-Hall, Englewood Cliffs, N.J., 1965. $10.00.

by Jacques E. Romain

The most frequent use of Laplace transformations is related to systems that may be represented by a linear differential equation, the problem being to find the system's response to a simple form of (single or periodically repeated) input. The usual "simple" inputs are those whose Laplace transforms are rational fractions in the new variable (essentially polynomials, step functions, exponentials, trigonometric functions). The purpose of this book is to cover the field thus defined. It is meant as an introduction to the topic; no previous knowledge of Laplace transforms is required. Introductory chapters on determinants, mathematical identities and methods for finding the roots of algebraic equations are included. The Laplace transform and the essential relevant theorems (including the treatment of recurring waveforms) are very clearly introduced, and immediately followed by a good many examples of fully worked out applications to electrical, mechanical and electromechanical systems, so that the method's practical possibilities are vividly displayed. The emphasis on detailed examples and the treatment of recurring waveforms are the essential features of this second edition. Other features of the book are the inclusion of useful extra tables [e.g., table of the modulus and argument of $1 - \exp(-j\theta)$: representation of basic dynamical and electrical quantities], the exposition of Holzer's iterated approximation method for a quick computation of the mode frequencies and the associated relative amplitudes, and an ingenious indexing of the (careful and detailed) table of Laplace transform pairs, which appears quite efficient in retrieving the required pair for the inverse transformation.

These qualities make the book perfectly fit as a textbook for an introductory course or for self-study. It is also appropriate for the reader who is not planning any specific application but who would like to know, at a moderate expense in pains and time, what the method is up to. (Such a reader should skip the first, second and fourth chapters). However, the title may be somewhat misleading, as it might suggest that the book is a full-fledged treatise covering the whole field of Laplace transformation. Indeed, it does not deal with such advanced questions as contour integration for the inverse transformation in cases where the transform pair is not available from tables, or the transform of less usual functions whose transform is of a more complex form than a rational fraction. (It is true that the latter limitation is easily overcome by using a separate table of Laplace transforms.)

In brief, this book may be unhesitatingly recommended to the great majority of readers, who have essentially to solve (sometimes quite complicated) well-behaved problems, be they new in the field or already familiar with it. But they must be aware that, were they ever to stumble on some unusual difficulty, more can be found elsewhere on the method.

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The reviewer, a scientific advisor for the Centre de Recherches Routières in Sterrebeek, Belgium, is currently engaged in research work on visco-elasticity, which involves frequent recourse to Laplace transform techniques.

Generalized functions

DISTRIBUTION THEORY AND TRANSFORM ANALYSIS. An Introduction to Generalized Functions, with Applications. By Armen H. Zemanian. 371 pp. McGraw-Hill, New York, 1965. $13.75.

by J. Gillis

Distributions have had a place in analysis since the days of Heaviside, but it is only during the past twenty years that they have had a name of their own. A great deal has been written about them during the latter period, but this book is the first attempt to present a fairly complete but elementary theory together with some idea of how it is to be applied.

The development is lucid, if unexciting, and contains all that one needs to know of basic theorems. The applications are disappointing in that all of those included could have been handled by classical Laplace or Fourier transform methods. This is not so

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much a criticism of the book as an observation on the theory itself.

A new mathematical theory can justify itself (1) by affording a broader and deeper understanding of existing mathematical concepts and techniques—a necessary first step toward extending and generalizing them, (2) by enabling us to solve otherwise intractable problems, and (3) as an opportunity for writing papers. So far distribution theory has distinguished itself under (1) and has no reason to be ashamed of its performance under (3). We still await substantial results of type (2).

The present book can be recommended as a coherent and comprehensive account of ideas and techniques. It will be useful to mathematicians who wish either to learn the subject or to teach it. The "engineers and scientists" to whom, among others, it is addressed, may be disappointed about the extent to which it is going to help them solve their problems.

Ideal fluids

THEORETICAL HYDROMECHANICS. By N. E. Kochin, I. A. Kibel', and N. V. Roze, Transl. from Russian by D. Boyanovitch. Transl. Edited by J. R. M. Radok, 577 pp. Interscience, New York, 1964. $20.00.

by Lawrence Talbot

This is an English translation of a classical Russian text on theoretical hydrodynamics which has gone through five editions in the original language. It constitutes the first of a two-volume work; the second volume on compressible and viscous flows has not yet been translated.

The material covered in this volume and the level of presentation are similar for the most part to that contained in Milne-Thomson's *Theoretical Hydrodynamics*. The first two chapters deal with the kinematics and dynamics of an ideal fluid; then come two short chapters on fluid statics and simple fluid motions. The remaining four chapters, which make up the major portion of the book, cover vortex motion, two- and three-dimensional motions of bodies in fluids, and wave motion. The chapter on vortex motion contains, among other things, the most extensive treatment of the von Kármán vortex street to be found in a textbook, including a proof that the "stable-spacing-ratio" deduced by von Kármán is in fact a condition of minimum instability because even this configuration is unstable to higher order disturbances.

The chapter on two-dimensional flows makes extensive use of conformal transformation techniques for both continuous and discontinuous flows. Among other things, the classical Joukowsky airfoil is treated and several alternative methods for solving free-streamline flows are discussed in detail. Flows about axisymmetric and ellipsoidal bodies are treated in the following chapter. The final chapter on wave motion treats linear and nonlinear waves on liquid surfaces and interfaces, and includes, among other things, some interesting material on waves in a compressible rotating atmosphere. Each chapter contains examples worked in the text, along with a short selection of problems at the end. The problems are for the most part quite simple and not as challenging as the excellent selection given in Milne-Thomson.

The presentation is remarkably clear and careful throughout. The steps in the analyses are given in sufficient detail so that a student with little previous exposure to the subject can follow them, and where delicate mathematical questions arise they are explained. Enough reference is made to physical situations to give the reader some feeling as to where ideal fluid analysis can be fruitfully applied. Although I do not read Russian, and hence cannot compare the original edition, the translation reads very well indeed. I have found no instance where the prose shows evidence of being derived from another language. There are relatively few typographical errors, and most of those present are transparent. The volume was produced by photo-offset from an unjustified typed manuscript, and both figures and text are quite readable. For so worthwhile a volume, however, it is a pity that a typeset format was not used. An adequate though not extensive index is supplied, and a rather sparse list of collateral references is given. Most of the references are original Russian papers and treatises of not-too-recent vintage. The volume could be improved by an updating of the bibliography. The preface to the Russian edition was omitted from the translation, a feature I find mildly annoying.

To summarize, this volume can be recommended without reservation to both students and researchers in hydrodynamics. It is surely one of the most lucid and readable accounts of the subject available in English today. It is a rather expensive volume, by textbook standards, and I venture to say that for this reason it will be less used as a college text than its excellence merits. I am looking forward (correctly, I hope) to the eventual appearance of an English translation of Volume 2 of this work. If it maintains the standards of Volume 1, it will be most welcome.

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High-energy interactions

COSMIC RAYS. D. V. Skobel'tsyn, ed. Transl. from Russian. 254 pp. Consultants Bureau, New York, 1965, Paper, $27.50.

by M. W. Friedlander

Volume 26 of the Proceedings of the Lebedev Physics Institute deals with some aspects of cosmic-ray physics. Because of this nature, I feel that my review should confine itself to indicating the topics covered: the merits of the individual articles cannot be reviewed in the usual manner.

First in the book is a 14-page survey of "Certain results of cosmic-ray investigations conducted with Soviet satellites and space probes". In so brief a coverage, the treatment is necessarily superficial, and fuller treatments of these data are available elsewhere. The remaining articles are all concerned with various aspects of very high-energy interactions: "extensive air showers", "A search for photons with energy $\sim 10^{13}$ eV due to local sources

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An associate professor at Washington University in St. Louis, M. W. Friedlander has been engaged in cosmic-ray work since 1950.