hoped that the gap will be closed, at least partially, in the near future if much effort is not to be wasted in sterile theorizing over false leads. A book like the present one, devoted to fundamental physical ideas, can do much to help train the generation of scientists who will have to close this gap.

The exposition is clear with the emphasis throughout on engineering rather than on space physics. The material covered can be estimated from the list of chapter headings: History and Character of MHD, MHD Approximation, Kinematic Aspect of MHD, Magnetic Force and its Effects, Boundary and External Conditions, Linear MHD, Magnetogasdynamics.

The large number of worked examples and set problems are well chosen to increase understanding. In many cases the discussion reaches to the frontiers of present knowledge and suggests possible lines of research.

For those who wish to understand the fundamental engineering problems of MHD this is an excellent text that can be very warmly recommended.

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J. Gillis is a member of the department of applied mathematics at the Weizmann Institute of Science in Rehovoth, Israel.

With erudition and skill

NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS IN ENGINEERING. By W. F. Ames. 511 pp. Academic Press, New York, 1965. $16.00

by J. Gillis

For nearly three centuries now, analysts have been actively developing techniques for solving linear differential equations, and their combined efforts have indeed led to the creation of fairly well defined procedures for use on such problems. Although difficulties encountered in actual cases are still sometimes enormous, we can say that by and large well posed linear problems are soluble.

Nothing remotely resembling this has taken place for nonlinear systems. Individual cases have been solved but no coherent theory exists. And now there is a danger that attempts in this direction will be discouraged by the philosophy of "Put it on the machine!" That would be deplorable. The reviewer prefers to believe in the ultimate triumph of the human spirit over such perils and in the ability of mathematicians to assimilate machine processes into their thinking to strengthen it rather than replace it.

Meanwhile we have our present problems to solve. The author has collected almost every technique and device ever used for solving nonlinear equations. It is true that these still fall far short of a rational theory comparable with the linear case. Nevertheless many practicing mathematicians will be agreeably surprised to find that a variety of methods do in fact exist—apart from first-order perturbation or computing! For each method we are given an examination of its validity and range of applicability, examples of its use, and an account of the general ideas needed for fitting it to possible applications.

The work falls into three main divisions. The first is devoted to exact solutions by way of transformations, similarity solutions, and the like. The second part is taken up with approximate analytic methods and the last with numerical procedures.

The erudition that has gone into the compilation is matched by the skill of the presentation. Difficulties are neither glossed over nor allowed to obscure main issues. The book is a most valuable addition to mathematical literature and is strongly recommended to all who are concerned with nonlinear problems.

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An outstanding reference book

TABLE OF LAPLACE TRANSFORMS. By G. E. Roberts and H. Kaufman. 367 pp. W. B. Saunders, Philadelphia, 1966. $6.75

by Jacques E. Romain

In comparison to most readily available tables of Laplace transforms, this book features three noteworthy qualities, each of which would suffice to render it commendable: (1) It contains an exceptionally large collection of transform pairs (a good three thousand); (2) the pairs are listed in separate tables for direct transforms and for inverse transforms; (3) in both parts, the functions to be transformed

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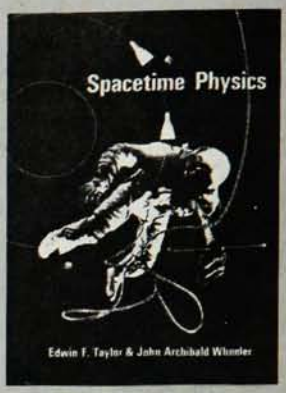


"This is a remarkable book—easy to read and entertaining, yet rigorous and scholarly; practical and down to earth, yet (including even the exercises) effulgent with imagination and philosophy." —Charles H. Townes, Nobel laureate, Massachusetts Institute of Technology

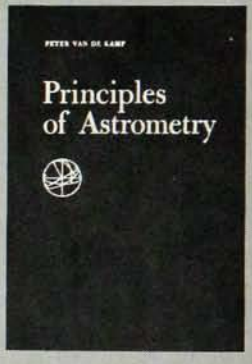
This introductory textbook in relativity may be used at every college and graduate level of instruction. Conceptual and mathematical simplicity make it an ideal text for use in introductory physics courses. Coverage of concepts important in mechanics and modern physics makes it suitable also for intermediate courses. Finally, the rigorous development and profound insights into all of physics make it an excellent book for both study and review by graduate students. More than 100 graded exercises will challenge students at all levels.

1966, 208 pages, 141 illustrations, $4.75

Principles of Astrometry

With Special Emphasis on Long-Focus Photographic Astrometry

PETER VAN DE KAMP, Sproul Observatory, Swarthmore College



This textbook, written by a leading authority in the field, is the first general introduction to the theory, technique, reduction methods, and results of astrometry, particularly of long-focus photographic astrometry. The level of the book is intermediate; an introductory knowledge of astronomy and an acquaintance with solid geometry, trigonometry, and calculus are assumed. In addition to its use as a text in courses in astrometry, the book will prove useful in courses dealing with double stars, galactic structure, spherical and practical astronomy, proper motions and parallaxes, descriptive astronomy (if on a sufficiently advanced level), celestial mechanics, and orbit determinations.

1966, 200 pages, illustrated, $4.75 (tent.)

Worlds-Antiworlds: Antimatter in Cosmology

HANNES ALFVÉN, Royal Institute of Technology, Stockholm

Written by a leading physicist, this book is the first presentation for a general audience of a new theory of the universe based on the assumption that matter and antimatter exist in the universe in equal quantities. Although the book is written for readers without any special training in physics or astronomy, the facts and ideas presented will be of interest even to specialists. The necessary background is provided in brief sketches of the historical development of cosmology, of its present state, and of the recent developments in particle physics and plasma physics that have important bearings on cosmology. Professor Alfvén explains the new theory fully, compares it to other models, and explores its implications for our understanding of such astronomical spectacles as supernovae, radio stars, and quasars.

1966, 120 pages, illustrated, $3.50

Examine these books at the combined book exhibit.

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are classified according to an ingenious coding system that enables the user to locate the desired entry swiftly. In each part, a preliminary section on "operations" lists functional relationships showing how to derive the (direct or inverse) transform of certain combinations of functions from the transforms of the individual components; this section, which is well developed, contributes an appreciable enlargement of the compass of the tables.

To check the actual efficiency of the adopted format, a couple of current Laplace-transform tables were taken and a few entries selected from them at random. Each of those entries was then looked up in the table under review. In each instance, the item was found to be present (in either an identical or an equivalent form), and retrieving it by means of the code was a matter of a few tens of seconds. Thus it turns out that the book lives up to its promises and, in view of the conjunction of the three abovementioned features, may well be qualified outstanding. The reviewer feels this may be the table he was in need of in the several instances when he stormed because the particular entry he was looking for was either missing in the tables or irritatingly hard to retrieve. As Roberts is engaged in system studies and Kaufman has served as a mathematical consultant, chances are that they have suffered from the same inconveniences. It is a good fortune that they took profit of their own sufferings to relieve those of their fellow scientists.

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The reviewer, a scientific adviser at the Centre de Recherches Routières in Sterrebeek, Belgium, is currently engaged in research on viscoelastic systems, involving use of the Laplace transform.

Up-to-date

INTRODUCTION TO NUCLEAR PHYSICS, by Harold A. Enge. 582 pp. Addison-Wesley, Reading, Mass., 1966. $12.75

by James O'Connell

This textbook is intended for third-year, fourth-year, or graduate students in a one- or two-semester course with some knowledge of elementary wave mechanics as a prerequisite. The topics covered are: the nuclear two-body problem, nuclear ground state properties, the shell and collective models, alpha, beta, and gamma-ray transitions, accelerators, detectors, nuclear reactions, nuclear energy (fission and fusion), and elementary particles. A number of appendices cover a review of quantum mechanics, focusing of ion beams (a topic on which Enge is an expert), and an extensive table of nuclides.

The aim of the book is to "describe certain selected experiments in nuclear physics and try to understand, by means of elementary theories, how these experiments can further our understanding of nuclear forces and nucleon structure." In general, the topics are approached by discussing the relevant ideas and measurement techniques, giving examples, or summaries of the data, and then applying relatively simple theoretical calculations to explain the data. There are numerous figures illustrating apparatus, data, and theoretical concepts. The references given are mostly from the 1950's.

Since the topics covered are fairly standard, it is worthwhile indicating some of the distinguishing features. In treating the deuteron and neutron-proton scattering a square well with a hard core potential is used. The hard core does not appreciably complicate the analysis while allowing good results to be obtained for the bound state root-mean-square radius (as determined by electron scattering) and for the high energy behavior of the S-wave phase shift. In the chapter on nuclear models the single-particle orbits in a distorted potential are discussed. This allows the correct prediction of otherwise anomalous ground state J-values of some light elements and forms a natural introduction to the rotation and vibration collective motion.

The author notes that "experimenters spend more combined effort on the measurement of angular momenta of nuclear states than on the measurement of any other parameter of nuclear physics." The chapters on alpha, beta, and gamma-ray transitions and on nuclear reactions emphasize this