

Senior staff openings in basic research

THE BOEING SCIENTIFIC RESEARCH LABORATORIES are engaged in a program of fundamental research designed to make contributions to the progress of the physical sciences. High-level staff positions are open now in the fields of

GAS DYNAMICS SOLID STATE PHYSICS
PLASMA PHYSICS ELECTRONICS
MATHEMATICS PHYSICAL CHEMISTRY
GEOASTROPHYSICS

Boeing grants scientists the latitude and independence needed to achieve and maintain leadership in their special fields. Scientists interested in carrying on their work in this kind of stimulating research environment are invited to communicate with Mr. G. L. Hollingsworth, Director, Boeing Scientific Research Laboratories.

*P. O. Box 3822 - PTC
Boeing Airplane Company
Seattle 24, Washington*



BOEING

... environment for dynamic career growth

lems of stability: comparison of solutions, indirect methods using auxiliary functions, and more abstract topological methods. The first two of these were thoroughly investigated by Liapunov and in many cases enable explicit answers to be given to important questions. The third is mainly the work of Poincaré and is more general in scope though it is not easily applicable to other than second-order problems.

Malkin's work is devoted in the main to the Liapunov second method and centers around the construction of the appropriate Liapunov functions which are essentially semidefinite convex functions (with respect to the time variable) of the variables entering the equation. While there is no general method for constructing these functions, enough examples are given of the appropriate functions for fairly comprehensive classes of differential equations to enable the method described to be used in a variety of practical problems.

This is a mathematics book but designed to enable the reader to solve practical problems. A selected number of examples are worked out in an extended fashion and the general treatment goes to some pains to bring out the underlying concepts of the method. The exposition transcends questions of stability alone—in particular, full treatments are given of singular and degenerate cases which show how general methods must be modified to take care of the special circumstances. Among the features particularly worthy of note is the analysis of second-order systems using the methods of Poincaré and Liapunov and an extended discussion of equations with periodic coefficients indicating how their regions of stability are to be established.

Because the methods used are so powerful, the author has been able to produce a valuable book from the point of view of mathematical and practical interest with hardly any reference to non-Russian mathematicians. The serious reader will probably find it worthwhile at least to glance at Cesari's review, "Asymptotic Behavior and Stability Problems in Ordinary Differential Equations", in the *Ergebnisse der Mathematik* series in order to assure himself of the contribution of Western mathematicians to some of these problems and to recognize the existence of other topics of interest in this subject.

Fonctions analytiques—Equations intégrales. Vol. 1 of *Le Calcul différentiel dans les Espaces de Banach*. By Aristotle D. Michal. 150 pp. Gauthier-Villars, Paris, France, 1958. Paperbound \$7.30. *Reviewed by C. M. Ablow, Stanford Research Institute.*

THE tendency toward abstraction and generalization characteristic of much of modern science is nowhere stronger than in mathematics. Established theorems are examined for excess hypotheses, and attempts are made to exhibit theorems as special cases of more general facts. For example, it is a classical theorem that the only continuous functions $f(x)$ satisfying $f(x+y) = f(x) + f(y)$ are constant multiples

of x . More generally the conclusion is valid if $f(x)$ is merely required to be bounded in the neighborhood of one value of x . More abstractly, in an inner product vector space with x a variable vector, for any such bounded linear functional there is a fixed vector v such that $f(x) = v \cdot x$.

The present booklet pursues its abstractions with many concrete examples, stopping on almost every page to illustrate the general theory with familiar instances. The generalities themselves are clearly suggested by classical theorems. Thus after careful introductory paragraphs defining Banach space and linear normed rings, functions reminiscent of polynomials are described. Convergent infinite sums of such monomials are the analytic functions of this theory. Examples are the iterated and resolvent kernels of Fredholm integral equation theory.

The Fréchet differential is next introduced and its use in general perturbation theory explained. For example, the formulas for the variation in the solution of an integral equation due to a perturbation of its kernel are exhibited in very simple general forms. Similar readily apprehended formalities show the dependence of the solution of a differential equation on the coefficient functions in that equation.

The book is carefully and clearly written in simple, nonidiomatic French. With its subject matter in applicable mathematics and its numerous historical references, the book presents a good introduction to abstract functional analysis.

Dictionary of Guided Missiles and Space Flight. Edited by Grayson Merrill, C. W. Besserer, K. A. Ehrlicke, & B. B. Small. 688 pp. D. Van Nostrand Co., Inc., Princeton, N. J., 1959. \$17.50. *Reviewed by Robert E. Street, University of Washington.*

ALTHOUGH this is the fifth volume in the series *Principles of Guided Missile Design*, it can by its very nature of being a dictionary be considered independent of the other volumes of the series. Rather it is intended, as the editor says, to be a sequel and companion to the *International Dictionary of Physics and Electronics* by the same publisher. The physicist who is familiar with the latter dictionary will find this one to be quite similar. The most common terms used in the field are defined both verbally and sometimes mathematically, when the latter is relevant. Quite a few terms are duplicated but on the whole the majority of mathematical and physical terms are not.

For example, terms in thermodynamics, kinetic theory, dynamics, etc., which were well defined in the earlier volume, are not repeated here. This does lead to some lack of balance, i.e., vector notation is used in some definitions but the definitions of the vector terms themselves are in the physics dictionary. Quite a number of physics and electronics words are given in expanded form, such as transistors, which now take up nine pages instead of two; many more fluid flow terms and a complete treatment of astronomical terms

*Important New
McGraw-Hill Books*

GERMAN-ENGLISH SCIENCE DICTIONARY

Third Edition

By LOUIS DE VRIES

Iowa State College

592 pages, \$7.00

The only compact yet comprehensive German-English dictionary specifically compiled for students who must read scientific articles and journals in the original German. The *Third Edition* includes over 3,000 new terms, and newly recognized translations of terms that have become important in scientific literature since the end of World War II. These new entries, for the sake of expediency, follow the Appendix. A new section, "Suggestions for Translators" has been added in the front of the book.

MECHANICAL RADIATION

By R. B. LINDSAY

Brown University

*McGraw-Hill International Series in Pure and
Applied Physics*

Ready in February

The book provides an introduction to wave motion at the senior-graduate level, using mechanical radiation as the principal vehicle, but laying stress on those aspects common to all kinds of wave propagation. Mechanical relation is presented in the broad sense in integrated form by bringing together a unified treatment of the most significant radiation aspects of acoustics. Though the principal emphasis throughout is theoretical, the author has not allowed the mathematical analysis to dominate the physical meaning of the results.

McGraw-Hill Book Co., Inc.

330 West 42nd Street • New York 36, N. Y.

Send for
copies on
approval