

Books

THE FRONTIER CHALLENGE

Responses to the Trans-Mississippi West
Edited by John G. Clark
The University Press of Kansas . . . \$10.00

This is a book of ten essays by eminent historians of the American West. The essays focus on how the inhabitants of the area—American settlers, Spanish-Americans, and Indians—developed and accommodated themselves to an environment which was itself constantly altered by the presence of a society in flux. Rodman Paul, professor of history at Caltech, contributes “The Spanish-Americans in the Southwest, 1848-1900” to the volume. The editor, John G. Clark, is a member of the faculty of the University of Kansas.

COMPLEX VARIABLES APPLIED IN SCIENCE AND ENGINEERING

By Harold Wayland
Van Nostrand Reinhold Company . \$9.50

This is a basic text on the theory and functions of a complex variable for the senior undergraduate or graduate student in the fields of physics, engineering, chemistry, or applied mathematics. Its author, Harold Wayland, is professor of engineering science at Caltech. In the book he brings the power of analytic function theory to bear on the solution of the common second-order linear differential equations of mathematical physics and the special functions associated with them. Of special interest is the inclusion of summaries—featuring those for solution of ordinary differential equations.

CAVITATION

By Robert T. Knapp, James W. Daily,
and Frederick G. Hammit
McGraw-Hill Book Company . . . \$25.00

Using a strong physical approach as its framework, this book discusses: (1) the genesis and occurrence of cavitation as a hydrodynamic phenomenon; (2) its effects on flow properties; and (3) its effects on equipment performance. Both mathematical analysis and experimental information are used. A main feature of the book is its careful examination of the physical characteristics of cavitation as it is observed, the supporting

analytical descriptions, and the discussion of particular practical experimental situations in terms of the basic mechanics of the phenomenon.

Robert T. Knapp, professor of hydraulic engineering at Caltech, was working on a manuscript on cavitation at the time of his death in 1957. James Daily, professor of engineering mechanics, and Frederick Hammit, professor of mechanical engineering—both of the University of Michigan—used Knapp’s notes and their own records of subsequent research to complete this volume.

DISCOVERY, INVENTION, RESEARCH, THROUGH THE MORPHOLOGICAL APPROACH

By Fritz Zwicky
The Macmillan Company . . . \$6.95

Reviewed by Albert G. Wilson

This is a translation of the author’s *Entdecken, Erfinden, Forschen im morphologischen Weltbild*, first published by Droemer Knauer in 1966. It makes available in English the most comprehensive description to date of many of Zwicky’s highly original epistemological ideas, including the methodologies of negation and construction, systematic field coverage, and the morphological box, but only cursorily mentions Zwicky’s theory of marks. The several types of morphological analysis are developed with illustrations that come mostly from Zwicky’s own specialties, but since these are many, there is something for almost everyone.

The reactions to Zwicky’s attempts to popularize the morphological method 30 years ago were highly polarized. On the one hand, morphology was regarded as an almost tautological way of thinking that every rational person used but did not bother to formalize. On the other hand, morphology was considered to be a formalization, but a sub-set, of the total analytical process that Zwicky used to make his inventions and discoveries. Unless one were equipped with an insightful intuition, deep knowledge in several specialties, and broad general knowledge, morphology could not be made to work.

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In other words, in addition to the formal steps given by Zwicky for the morphological process, the step “first, become a genius” should be added. But Zwicky feels everyone *is* a genius, and therefore the morphological method could be used by anyone.

His faith in the intellects of his fellow men may yet prove warranted. Recently the morphological method has been discovered by forecasters and long-range planners and is being fruitfully applied in many problem areas. Most recent texts on forecasting include chapters describing the use of Zwicky’s morphological matrices in futuribles. With increasing evidence that morphology is a useful tool in many hands, *Discovery, Invention, Research* should be read by all who anticipate they might have a problem of some sort to solve in the next few years. The book may be read eclectically with profit by those wishing an introduction to morphological methods; or may be read in its entirety with enjoyment by those who would like a behind-the-scenes glimpse into the thinking processes and personality of one of the 20th century’s most original thinkers.

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

By Leon Lapidus and John Seinfeld
Academic Press . . . \$16.50

The authors of this book have three objectives: first, to bridge theory and practice; second, to provide definite recommendations on which methods to use in specific situations; and finally, to prepare the reader for the published literature on numerical integration of ordinary differential equations. They consider in detail problems of current interest, for example, hybrid methods, extrapolation methods, the generation of highly stable algorithms, and the numerical integration of stiff ordinary differential equations. The book is designed for engineers, computer scientists, and workers in industrial research laboratories. It can also be used in upperclass or first-year graduate courses in numerical analysis. Lapidus is professor of chemical engineering and chairman of the department at Princeton University, and Seinfeld is associate professor of chemical engineering at Caltech.