

Mass Transfer

Convective Mass Transfer. By D. B. Spalding. McGraw-Hill Book Company, Inc., New York, N. Y., 1963. Cloth, xiii and 448 pp. \$12.50.

REVIEWED BY R. W. BAIN¹

THE PROBLEMS of mass transfer have long been the concern of chemical engineers who have developed an extensive theory of such transfer processes. In recent years however, important applications have been discussed in other areas, notably in high-speed aircraft and rocket propulsion, combustion processes generally, and in the heating problems associated with high-speed flight. The methods used in these various areas have developed along slightly different lines, with different assumptions appropriate to the conditions encountered, and Professor Spalding's book provides a very welcome unified account of the whole theory of mass transfer, which will be suitable for engineers working in any of the fields in which mass transfer processes occur. As the author points out, specialists in particular fields may find the notation unfamiliar and apparently clumsy, but this is a small penalty to be weighed against the valuable simplifications arising from the use of single set of concepts applicable to all mass transfer problems.

The level of mathematical knowledge demanded of the reader is not high and, as the author says, this has restricted the completeness of the derivation of formulae and the range of practical problems considered. However a later volume is promised in which the theoretical foundations of the subject will be firmly laid and, as far as practical problems are concerned, the present volume covers a wide enough field, presenting methods of calculation appropriate to absorption processes, transpiration cooling, simple combustion processes, and cooling tower design.

Elasticity

Tensors in Mechanics and Elasticity. By Leon Brillouin. Academic Press, Inc., New York, N. Y., 1964. Cloth, 6 × 9 in., xvii and 478 pp. \$12.50.

A translation by Robert O. Brennan of the well-known French edition—*Editor*.

Astrodynamics

Orbital Dynamics of Space Vehicles. By Ralph Deutsch. Prentice-Hall, Inc., Englewood Cliffs, N. J., 1963. Cloth, xv and 410 pp. \$16.

REVIEWED BY R. M. L. BAKER, Jr.²

AS INDICATED in the preface, "the objective of the book is to provide a comprehensive foundation in the theory of the dynamical motion of space vehicles." It is also noted that the book is not designed to be a treatise on celestial mechanics. Emphasis has been placed on the theoretical foundations and not the final results. Thus the book is not an engineering one, and as one proceeds through the text one finds little or no numerical examples. Nevertheless, the initial formulations of many problems are given and most of these are accompanied by a brief sketch of the solution technique. Like most other texts in astrody-

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namics, the motions of a space vehicle relative to its center of mass are neglected and emphasis is instead given entirely to the problem of the motion of the center of mass.

After careful reading, it is evident that the text does precisely what it is set out to do, that is, it presents a thoroughgoing foundation to the subject of astrodynamics. Few typographical errors are to be found, the presentation is lucid, and a discussion of Hansen's method (pp. 236–255), Vinti potential (pp. 187–190), are particularly outstanding. The reviewer recommends the book to any professional astrodynamist.

Experimental Stress Analysis

Experimental Stress Analysis and Motion Measurement. By R. C. Dove and Paul H. Adams. Charles E. Merrill Books, Inc., Columbus, Ohio, 1964. Cloth, 6 × 9 in., xii and 515 pp. \$17 (text edition, \$12)

REVIEWED BY ROSCOE GUERNSEY, Jr.³

AS THE title indicates, this book is divided into two major parts. In part I, comprising about three fourths of the book, consideration is given to the theory and application of the various modern methods of experimental stress analysis with emphasis on electrical resistance strain gages and photoelastic methods. A new feature is the elementary discussion of the moiré method of strain measurement, which has not been treated in other books of this type.

Part II contains a treatment of current methods and instruments for measurement of displacements, velocities, and accelerations. Both steady-state and transient motions are considered in connection with seismic instruments, and the various sources of error are analyzed. Considerable space is devoted to the application of accelerometers, their calibration, and practical problems encountered in their use.

This book is designed for use as a text for a course given at the undergraduate or early graduate level. To this end the mathematical treatment is simplified so that extensive knowledge of differential equations, advanced mechanics, and electrical circuit theory is not required. The theoretical material is clearly written and of lasting value, and the descriptions of current commercial instruments will prove useful until these become obsolete. Each chapter also contains problems for solution by the students and a set of suggested laboratory experiments which most schools should be equipped to carry out. Bibliographical references are given at the end of each chapter for those desiring to investigate a given subject in greater depth, a good feature for encouraging young students to use the library. This book should prove very useful as a text for a first course in experimental methods, and older hands may also find it a convenient reference.

Chemical Physics

Advances in Chemical Physics, Vol. 5. Edited by I. Prigogine. Interscience Publishers, New York, N. Y., 1963. Cloth, 6 × 9 in., ix and 410 pp. \$16.50.

REVIEWED BY EDWARD F. GREENE⁴

THIS latest volume in a series of books devoted to chemical physics is a collection of nine review articles. Hartmann discusses the one electron theory of π -electron systems, Jørgensen

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