

rect quotations from original sources are used liberally. This technique is in line with the stated objective of describing atolls, an objective that is admirably attained. Although future studies will add major and minor details of ecology, the book serves a timely need.

Unfortunately, but doubtless because of his objective, Wiens made less use of cross-references between different fields of study than might be desirable; he preferred to treat each as a separate entity. Perhaps for the same reason, there are few new deductions or discoveries resulting from the compilation. The book is essential reading for future workers on atolls, regardless of their fields of inquiry.

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Infeld Festschrift

Recent Developments in General Relativity. A collection of papers dedicated to Leopold Infeld. Państwowe Wydawnictwo Naukowe, Warsaw, Poland; Pergamon, New York, 1962 (order from Macmillan, New York). 472 pp. \$8.

This book, a collection of 45 individual contributions, was, during its period of gestation, known as the "Infeld Festschrift," and it is dedicated to Professor Leopold Infeld, former collaborator of Albert Einstein and now professor at the University of Warsaw, on the occasion of his 60th birthday. It consists of seven review articles (part 1) and 38 contributions that represent original research papers (part 2). The list of contributors represents at least half a dozen countries, but only two languages—English and French—are used in the volume (the latter being used for only three papers).

The importance of this otherwise representative collection is marred by the inordinate delay between the solicitation of contributions (as far as I am aware, the announced, and enforced, deadline was December 1959) and the date of publication (1 August 1962, in the United States). Perhaps such delays are to be expected when publishers in different countries collaborate without much previous experience. At any rate, the typography and press work are all that could be desired.

The review articles are concerned with the theory of motion (Bażański), the program of quantization of the gravitational field (Bergmann and Komar), cosmology (Bondi), experimental verification (Ginzburg), various mathematical problems, both local and global (Lichnerowicz and Fourès-Bruhat), theory of gravitational radiation (Pirani), and unified field theory (Tonnelat). The remaining articles may be considered to fall into one, or several, of the categories indicated by the review articles, which indeed represent the major areas of research activity in general relativity during recent years. The average length of the so-called review articles exceeds that of the other articles by only about 50 percent. The editorial committee thus succeeded in presenting several approaches in those areas in which opinions widely differ, rather than selecting "orthodox" views.

The nonspecialist theoretical physicist should be able to derive significant information from this volume, but all contributions are technical and were written with fellow experts in mind. The book will undoubtedly grace the reference shelves of all active relativists.

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Useful Alternate Procedures

The Analysis of Titanium, Zirconium, and Their Alloys. W. T. Elwell and D. F. Wood. Wiley, New York, 1962. xi + 198 pp. Illus. \$7.75.

This valuable compendium of practical and generally reliable methods should be helpful to chemists who have a practical interest in analyses of titanium or zirconium, but there are deficiencies in the sections dealing with the analyses for hydrogen and oxygen. The authors do not mention the commercial availability in the United States of superior apparatus for vacuum fusion and hot extraction. At least three competitive manufacturers provide units which are comparable in accuracy but which are also much less complicated and many times faster than the apparatus described in this book. Chemical methods for oxygen, such as the chlorination procedure described by the authors, have been tested and abandoned by many competent laboratories. The

apparatus described for determining nitrogen and carbon are also cumbersome and slow, and they offer no advantage in precision or accuracy.

The stated *Reproducibility* (defined as the standard deviation) constitutes an interesting figure of merit for each procedure, as it did in the previous titanium edition. But it is discouraging to note that these values and the methods have not changed significantly since 1959.

The bibliography cites some materials that are either out-of-print or have been replaced by more recent publications. Fourteen of the 58 references involve work by the authors, and more vital publications are not mentioned: for example, recent papers in *Analytical Chemistry* on improvements in the determination of oxygen.

These criticisms, which are mostly concerned with things *not* included in the text, suggest that Elwell and Wood have underestimated the importance of the book to persons outside their own laboratories. In the United States the book will be a useful source of many good alternate procedures, for most of the methods are quite different from those published by the American Society for Testing and Materials. Many methods are presented for determinations that have not been tested by ASTM or other recognized authorities. These will be of particular interest in many laboratories, and they could result in improved performances.

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Applied Mathematics

Fourier Series. Georgi P. Tolstov. Translated from the Russian and edited by Richard A. Silverman. Prentice Hall, Englewood Cliffs, N.J., 1962. x + 336 pp. Illus. Trade ed., \$13; text ed., \$9.75.

An Introduction to Fourier Analysis. R. D. Stuart. Wiley, New York, 1961. 126 pp. Illus. \$3.

The first of these books is, according to the publisher, a translation of the standard introductory work on Fourier series and boundary value problems used in the Soviet Union. Tolstov deals with the subject matter in an up-to-date

but not unduly abstract fashion. The book should be easy reading for anyone with a good background in calculus and, perhaps, a few topics in advanced calculus.

The exposition begins with the most elementary considerations and develops into a clear and well-motivated treatment of expansions in Fourier series, general orthogonal expansions, operations with Fourier series, convergence and summability of Fourier series, double Fourier series, Fourier integrals and transforms, Bessel functions and Fourier-Bessel expansions, the eigenfunction method, and the application of the latter to boundary value problems. Although only the Riemann integral is employed, the book emphasizes the basic role of absolutely integrable and square integrable functions. Nowhere, however, does the analysis become so heavy-handed that it spoils the essential simplicity of the treatment.

One of the outstanding features of the book is the large number of excellent and refreshing problems, for most of which hints and solutions are furnished in the appendix. This feature makes the book exceptionally valuable for self-study.

An Introduction to Fourier Analysis, by R. D. Stuart, was written mainly for students of science and engineering and "full mathematical rigour has not been attempted." It is my belief that a genuine understanding of and insight into the theoretical aspects of Fourier series and integrals is not provided by this exposition as it is by that of Tolstov. There are numerous places where the reader of Stuart's book will be left with false impressions by such things as faulty definitions, poor choice of words so that conditions which are only sufficient appear to be stated as necessary ones, failure to state the assumptions made in certain derivations, and so on. See, for example, the definition of "piecewise continuous" functions, the statement concerning Dirichlet's conditions, and the evaluation of coefficients on pages 11-13.

In spite of its quite inadequate treatment of the mathematical preliminaries (which may perhaps be blamed on the pressure of space in such a small volume), the book contains a most valuable collection of applications to modern and vital physical problems that are of interest to scientists and engineers. The chapters on the analysis of transients, circuit analysis, and wave

motion are particularly commendable.

It seems appropriate to suggest that Stuart's book will be a valuable complement to Tolstov's book for those interested in the type of application described above.

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Notes

Techniques and Analysis

This second edition of Werner Holzbock's **Instruments for Measurement and Control** (Reinhold, New York, 1962. 398 pp. \$10) is, like the first edition, a descriptive book for plant process engineers and technicians engaged in traditional civilian industry. Much of the detailed discussion has been rewritten, several measurement techniques have been added, and a few have been deleted, but the general organization and content remain unchanged. It still contains little or no discussion of the physical principles or of the limitations of the techniques described and no discussion of the special needs of the increasingly important space and nuclear industries.

The book consists of three distinct and nearly independent parts, without formal division among them. The first part describes automatic and manual techniques for measuring and recording the following quantities, with a chapter devoted to each: temperature; moisture content; pressure; flow, both fluid and solid; liquid level; density; viscosity; and angular speed. The second part (one chapter) is a discussion, entitled "Analysis," of methods of chemical analysis, usually for one component only, of gases and liquids by means of a single measurement such as heat of combustion, thermal conductivity, change of volume, and refraction index. The determination of some other material characteristics, such as pH, dielectric constant, and flash point are also discussed. In the third part, the following topics are described, each in one chapter: controller action; electric controllers; pneumatic and hydraulic controllers; time function controllers; and final control elements, especially valves.

The book is not intended to be a complete catalog of the techniques used

in process control; but to omit the pulse generator-electronic counter method of measuring angular speed, which was briefly described in the first edition, is surprising, particularly in view of the subsequently developed digital recorders that are suitable for use with these counters. Holzbock's discussion of the transducer technique of measurement and transmission, particularly of pressure and flow, could also profitably be expanded.

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New Books

Mathematics, Physical Sciences, and Engineering

Diffuse X-ray Reflections from Crystals. W. A. Wooster. Oxford Univ. Press, New York, 1962. 211 pp. Illus. \$5.60.

Elements of Mathematical Statistics. J. F. Ratcliffe. Oxford Univ. Press, New York, 1962. 212 pp. Illus. \$4.

Fifty Years of X-ray Diffraction. P. P. Ewald, Ed. Oosthoek's, Utrecht, Netherlands, 1962. 726 pp. Illus.

Geometric Transformations. I. M. Yaglom. Translated from the Russian by Allen Shields. Random House, New York, 1962. 140 pp. Paper, \$1.95.

Hyperconjugation. Michael J. S. Dewar. Ronald, New York, 1962. 190 pp. Illus. \$6.

Instruments for Measurement and Control. Werner G. Holzbock. Reinhold, New York, ed. 2, 1962. 398 pp. Illus. \$10.

Nomography and Empirical Equations. Dale S. Davis. Reinhold, New York; Chapman and Hall, London, 1962. 269 pp. Illus. \$8.

Perturbation Theory and the Nuclear Many Body Problem. Kailash Kumar. North-Holland, Amsterdam; Interscience (Wiley), New York, 1962. 243 pp. Illus. \$9.75.

The Problem of Induction and Its Solution. Jerrold J. Katz. Univ. of Chicago Press, Chicago, 1962. 138 pp. \$3.75.

Shock Waves in Chemistry and Physics. John N. Bradley, Methuen, London; Wiley, New York, 1962. 383 pp. Illus. \$11.

Study Guide for Basic Concepts of Physics. Arthur Beiser and Germaine Beiser. Addison-Wesley, Reading, Mass., 1962. 128 pp. Illus. Paper, \$2.25.

Study Guide for the Mainstream of Physics. Arthur Beiser and Germaine Beiser. Addison-Wesley, Reading, Mass., 1962. 174 pp. Illus. Paper, \$0.95.

Synthesis of Optimum Nonlinear Control Systems. Harry L. Van Trees. Massachusetts Institute of Technology Press, Cambridge, Mass., 1962. 111 pp. \$4.

Thorpe's Dictionary of Applied Chemistry. vol. 5. Jocelyn Field Thorpe and M. A. Whiteley. Wiley, New York, ed. 4, 1962. 633 pp. Illus. \$20.