

comfort." Yet one must leave the discussion with a considerable note of pessimism. As Michael concludes, "Certainly ours would not be the first society that disappeared because it could not find a way to accommodate in time to changes generated within it by its own momentum and style." To which Clark adds, "The limiting factor is not technology; it is our lack of imagination and our indecisiveness in allocating our resources," and Michael replies, "The question really is how to change institutions so that leadership arises in a given situation and then acts". . . "We need to know how to provide (wise men) with an environment that will encourage their wisdom to blossom and act."

As with all edited volumes involving multiple contributors, there are substantial gaps in the presentation (which will, perhaps, be elaborated in subsequent volumes). Some of the questions and comments are so penetrating, one wishes the discussants had been identified by the editors. Their ideas are significant and quotable.

On the whole, Morse and Warner are doing a signal service in organizing and publishing these seminars.

Lloyd Berkner is Chairman of the Board of Trustees of the Graduate Research Center of the Southeast and a professor at the Southwest Center for Advanced Studies, an academic arm of the GRC. He was President of the GRC from its inception in 1960 until 1965, when for the ensuing year he assumed the responsibilities of Director of the SCAS. He was formerly President of Associated Universities, Inc., which organized and directs Brookhaven National Laboratory and the National Radio Astronomy Observatory.

In addition to several honorary doctoral degrees from universities in this country and abroad, including those of Edinburgh, Calcutta, and Sweden, he has received many awards, among which are the Distinguished Alumnus Award (1952) from his alma mater, the University of Minnesota; the John A. Fleming Award of the American Geophysical Union (1962); and the Cleveland Abbe Award of the American Meteorological Society (1963).

He is retiring Chairman of the Space Science Board of the National Academy of Sciences and Treasurer of that Academy, past President of the International Scientific Radio Union, the International Council of Scientific Unions, the Institute of Radio Engineers, and the American Geophysical Union, and a Fellow of the American Academy of Arts and Sciences, the American Physical Society, and the Royal Swedish Academy of Sciences.

With over 100 scientific and technical papers to his credit, he has authored a recent book, The Scientific Age (Yale, 1964) and edited two others, Rockets and Satellites (Pergamon, 1958) and Science in Space (McGraw-Hill, 1961).

IMPRECISE AND INPUT ORIENTED

Title Measurement and Analysis of Random Data

Authors Julius S. Bendat and Allan G. Piersol

Publisher John Wiley & Sons, 1966

Pages xv + 390

Price \$17.75

Reviewer Emanuel Parzen

Time series analysis has a long and complicated history. It has for many years been of interest to an advanced fringe of researchers in such diverse fields as communication theory, control theory, aerospace studies, structural vibration studies, acoustics, oceanography, seismology, medicine, economics, management science, and operations research. Recently, however, the interest seems to be growing exponentially. Indeed, it seems that we are about to enter the golden age of time series analysis—when its possibilities will burst upon the popular consciousness, when it will be systematically and routinely applied, and when its instrumentation and application will be an important industry.

There seem to be two worlds of time series analysis which hardly interact. On the one hand, there is research on time series analysis as

part of applied mathematics concerned with blending probability theory (as needed to study stochastic models of processes evolving in time and space), statistical theory (as needed to develop methods of inference for analyzing and synthesizing models), numerical analysis (as needed to develop methods of handling large masses of data and efficient computer algorithms), and system theory (as needed to describe time series as inputs and outputs of systems). On the other hand, there is engineering activity concerned with the collection and processing by special purpose instruments of time series that arise in actual applications in real time.

The book under review is "directed toward the goal of bringing together and clarifying the various disciplines required to properly measure and analyze random physical data." The first four chapters (171 pages) present standard introductory material on probability and stochastic processes, linear systems, and statistical inference. Chapters 5-7 (130 pages) present techniques for estimating first-order probability distributions, autocorrelations and power spectra, and cross-spectra for frequency response functions for multiple time series. Chapter 8 (11 pages), which should have presented an illustrative "detailed analysis" of a set of real data, seeks to provide a practical proof of a theoretical formula. Chapter 9 (45 pages) is on analysis of non-stationary data and provides very little insight.

The unique parts of the book, Chapters 5-7, may be useful to an engineer to orient him to the kinds of calculations that might be performed to describe the statistical characteristics of time series. However, the discussion is input oriented rather than output oriented; it is concerned with what to compute rather than how to gain insight from the computations made. These chapters would be of value if read in conjunction with a survey by a time series statistician, such as the excellent paper, "A Survey of Spectral Analysis," by G. M. Jenkins, *Applied Statistics*, Vol. 14, pp. 2-32 (1965).

The applied mathematician and statistician may find the exposition too imprecise for his taste; for example, the author's notation for random variable $x(k)$ is not standard, and his four conditions on page 91

that a stationary Gaussian process be ergodic are easily replaced by the more elegant condition

$$T^{-1} \int_{-T}^T |C_x(\tau)| d\tau \rightarrow 0 \text{ as } T \rightarrow \infty.$$

The book is intended for the practical engineer rather than the theoretician. The list of references is very short and includes almost no theoretical work.

Emanuel Parzen is Professor of Statistics at Stanford University and the author of two books and numerous research papers. He was a Visiting Professor at Imperial College, London, in 1961-62 and at MIT in 1964. He is Associate Editor of the S.I.A.M. Journal of Control, and Chairman of the Institute of Mathematical Statistics. His PhD (1953) is in mathematics, from the University of California, Berkeley.

FOR THE MAN WHO HAS EVERYTHING

Title Internal Conversion Processes

Editor Joseph H. Hamilton

Publisher Academic Press, 1966

Pages xxv + 669

Price \$22.50

Reviewer Morris L. Perlman

The analysis of measurements of radiations emitted when nuclei de-excite by internally converted transitions has yielded a great deal of spectroscopic information about the transitions themselves and about the nuclear states between which they occur. Internal conversion methods are fairly well known and they have been employed at least to some extent by most nuclear spectroscopists. This is not to say that they are so

well-worn as to be dull. Development and refinement of both experiment and theory are still proceeding; and from time to time new types of information are shown to be obtainable by use of internal conversion methods, often in combination with other types of measurements.

In 1963 at Warsaw and again in 1965 at Vanderbilt University, Nashville, Tenn., conferences were held at which internal conversion was discussed in detail. The Proceedings of the 1965 conference constitute the major part of the book *Internal Conversion Processes*, which was edited by the conference organizer, J. H. Hamilton. There were approximately 60 invited and contributed papers presented at the conference, and most of these were followed by some discussion. In addition to this material, the volume includes several survey articles covering theoretical and experimental aspects of the subject matter. Also included are several tables useful to practitioners. Most of these tabulated data—on *L*-shell particle parameters and on conversion matrix elements and phases—have not been available elsewhere.

The papers of the Proceedings are, not surprisingly, a mixed bag; they range in quality from that of excellent journal articles to that of mediocre contributions at a large meeting. Indeed, some of the better material has been appearing in journal articles. The several survey papers, making up about one-eighth of the volume, are authoritative; however, they do not differ greatly from what may be found in some of the standard works, as, for example, *Alpha-, Beta-, and Gamma-Ray Spectroscopy*, edited by K. Siegbahn.

If one wishes to have, gathered in a handy tome, general information about internal conversion theory and methods and a large amount of specific information about many of the various applications actually being made, then this work should be useful. Because it includes a plethora of references, it is useful also as an entry to the voluminous literature. This is a book which should be readily available to the nuclear spectroscopist and to the individual

interested in getting a view of the somewhat special field. It is regrettable that works of this kind are not published in some inexpensive format, perhaps such as some laboratories use for annual reports. This reviewer doubts that many individual researchers will wish to buy personal copies of this rather costly volume; but for the man who has everything

Morris Perlman is a senior chemist at Brookhaven National Laboratory, where most of his research has been concerned with nuclear spectroscopy and with problems involving atomic electrons and nuclear transitions. Prior to coming to BNL in 1949, he worked at the Radiation Laboratory in Berkeley, at Los Alamos, and for about two years with General Electric. His undergraduate work was done at Louisiana State University; his PhD (1940) is in physical chemistry from the University of California, Berkeley.

BOOK ANNOUNCEMENTS

Although the following books will not be reviewed, they may be of interest to some of our readers:

Experience and Theory, Stephan Körner, Humanities Press, 1966, 250 pp, \$7.50.

Principles of Radiation Protection Engineering, Lawrence Dresner, McGraw-Hill, 1965, 451 pp. \$15.00.

A Fortran IV Primer, Elliott I. Organick, Addison-Wesley, 1966, 263 pp, \$4.95.

Zone Melting, Hermann Schildknecht, Academic, 1966, 222 pp, \$9.00.

Fortran II and IV for Engineers and Scientists, Hellmut Golde, MacMillan, 1966, 224 pp, \$4.50.

High-Temperature Chemistry of Silicates and Other Oxide Systems, Nikita Aleksandrovich Toropov and Valentin Pavlovich Barzakovskii, Consultants Bureau, 1966, 216 pp, \$25.00.