

Modern Approach to Optics

Introduction to Fourier Optics. JOSEPH W. GOODMAN. McGraw-Hill, New York, 1968. xiv + 287 pp., illus. \$13.50. McGraw-Hill Physical and Quantum Electronics Series.

Optics has undergone a number of dramatic changes during the last 15 years. A number of factors caused the rebirth of this important branch of physics; some of these factors were the new theoretical ideas of the statistical properties of light, the influence of communication theory, and, finally, the invention of the laser. A significant portion of this revitalization came from electrical engineers discussing and participating in (and often rediscovering) optical physics. The concepts of Fourier analysis so familiar in a one-dimensional form to electrical engineers have in the two-dimensional form become a necessary part of teaching and research in optics. It is not surprising, then, to find an introduction to Fourier optics written for graduate electrical engineering students by an applied physicist turned electrical engineer. As Goodman says in his preface, "Fourier analysis and linear systems theory provide the foundation on which the theory of image formation, optical data processing, and holography are constructed." I think I would prefer to say that Fourier analysis and linear systems theory provide the mathematical tools for the understanding of the propagation of light which is basic to an appreciation of a majority of optical phenomena. Goodman clearly recognizes this order of importance, for after a brief introduction he discusses the analysis of two-dimensional linear systems and the foundation of scalar diffraction theory. This background is then used to develop a variety of topics, including Fresnel and Fraunhofer diffraction, image formation, frequency analysis of optical systems, spatial filtering, and information processing and holography.

This sounds exciting and interesting, and it is. Goodman does an excellent job of conveying the interest and fascination of this modern approach to optics. For example, I have always found students responsive to a derivation of the usual lens laws from a discussion of propagation of spherical waves through a lens.

It is a pleasure to see the foundations of diffraction theory discussed in a straightforward manner: the Kirchhoff and Rayleigh-Sommerfeld formulations of diffraction and that using the angu-

lar spectrum of plane waves are all included.

The book as a text is well written, with very few errors. References are given with each chapter to some of the original papers; these are not really a satisfactory cross section, but they are nevertheless useful. Problems are well selected. It is a shame that the few photographs illustrating optical phenomena are so poor and infrequent—optics is a visual subject, and every opportunity should be taken to exploit that fact. The text has the brashness but also the refreshing excitement that a relative newcomer brings to a subject, and will undoubtedly find a deserved place among the best optical books.

BRIAN J. THOMPSON

Institute of Optics, University of Rochester, Rochester, New York

Bioclimatology

The Measurement of Environmental Factors in Terrestrial Ecology. A symposium, Reading, England, 1967. R. M. WADSWORTH, L. C. CHAPAS, A. J. RUTTER, M. E. SOLOMON, and J. WARREN WILSON, Eds. Blackwell Scientific Publications, Oxford, 1968. x + 314 pp., illus. \$9.50. British Ecological Society Symposium No. 8.

It is stated that the purpose of this volume is to bring together details of methods which the ecologist can use in the field and to discuss recording and handling of the records obtained. In the reviewer's opinion the book falls considerably short of this objective. Twenty-one subjects are covered in a little over 250 pages. The brief amount of space allotted to each subject allows for little more than a superficial description of methods. The wide range of subjects covered limits the amount of material applicable to any one reader. The nearly 50 pages devoted to brief descriptions of demonstrations and an attendance list would have been better utilized in expanding the individual papers.

Subjects covered include the measurement of environmental conditions in stored food products, the measurement of climate of soil and litter animals, interception of rainfall, light and temperature in relation to the slug, soil aeration, data processing and acquisition, and radiotelemetric techniques. This wide range of topics results in there being little relation between consecutive chapters.

Certain chapters are of special inter-

est to environmental biologists. Long gives a general discussion of the measurement of the microclimate and presents a large amount of information on instruments and techniques. Idle's paper "The measurement of apparent surface temperature" presents a good brief discussion of this rather complex problem. Caborn's paper briefly surveys workable methods for the measurement of wind speed and direction from the point of view of the ecologist. It is a good starting point for those interested in the problem. Szeicz's paper "Measurement of radiant energy" covers radiation components and possible instrumentation both above and below the canopy. The paper "Crop environment data-acquisition" by Blackwell and Blackburn presents in a few pages some very useful information for those in biology who are concerned with the acquisition of large quantities of data. It is interesting to note that the chapters that merit special mention are all among the longest in the volume.

Meteorologists and biologists already doing considerable specialization in measuring the environment will find the information too brief and elementary to be of much use. However, the book is not directed toward this group. Environmental biologists, in general, should find the five chapters mentioned specifically of interest to them. Most of the other 16 chapters will probably be of marginal use because of their specialized subject matter.

ROBERT H. SHAW

Climatology and Meteorology, Iowa State University, Ames

Statisticians' Meeting

The Future of Statistics. Proceedings of a conference, Madison, Wis., 1967. DONALD G. WATTS, Ed. Academic Press, New York, 1968. xviii + 318 pp., illus. \$12.50.

This book comprises the proceedings of a conference held to celebrate the completion of the Computer Sciences-Statistics Center at the University of Wisconsin.

The first half of the book consists of six papers and two panel discussions on general topics relating to statistics. The participants in these sessions are G. A. Barnard, G. E. P. Box, W. J. Dixon, H. O. Hartley, J. S. Hunter, O. Kempthorne, J. C. Kiefer, L. M. LeCam, A. G. Oettinger, Guy H. Orcutt, L. J. Savage, and J. W. Tukey.

Several important themes appear and