

c_{ij} and s_{ij} which have been variously called elastic constants, moduli, coefficients, stiffnesses and compliances. The last two ("stiffness constant" for c_{ij} and "compliance" for s_{ij}) get Christian's particular endorsement.

Seldom can one say with any assurance, on reviewing a new book, that it is destined to become a classic in its field. Christian's book, however, affords us one of those rare occasions which it is a pleasure to acknowledge.

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The reviewer is manager of the Martin Company Materials Research Laboratory at Orlando, Florida.

Hot gases

RADIATIVE CONTRIBUTIONS TO ENERGY AND MOMENTUM TRANSPORT IN A GAS. By Douglas H. Sampson. 178 pp. Interscience, New York, 1965. \$8.50.

By R. Landshoff

Any calculation whose results depend on the energy and momentum balance of a very hot gas must include the contributions of the radiation field. Sampson's book is intended to indicate to research engineers how these radiative contributions arise and how they should be calculated under various conditions. Actually the emphasis of the book is not really pointed to the practical questions that are of interest to the research engineer, who would probably be quite happy to accept a more intuitive line of reasoning. Instead the book leans heavily on a rather formal approach. The radiative transport equation, for example, is regarded as the Boltzmann equation of the photon gas. The intuitively obvious result that one can equate the heating of the gas with the excess of absorption over emission is then derived from this Boltzmann equation following essentially the well known method of Chapman and Cowling for deriving the conservation relations of an ordinary gas. The emphasis on formalism shows up even more strikingly in an attempt to extend the theory to situa-

tions where one can not assume local thermodynamic equilibrium. By expressing the nonthermal distribution of the gas in terms of a set of pseudotemperatures the author manages to give the equations a deceiving look of elegance. This formulation doesn't really help with finding the distribution itself which is the hardest part of the problem when one can't assume LTE. As a matter of fact we acquire the additional bookkeeping problem of having to translate the one-parameter set of occupation numbers into the two-parameter set of temperatures T_{ab} .

In the sections devoted to applications, the reader is introduced to solutions of the transport equations when the gas is optically thick or thin and with or without scattering. Some mention is also made of cases of intermediate optical thickness. This presentation stays largely away from detail except for a discussion of surface concepts. For the calculation of radiative absorption coefficients and for numerical integration procedures the reader is referred to other sources.

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R. Landshoff is a department manager with the Missiles and Space Division of the Lockheed Aircraft Corporation.

Optical technology

MODERN OPTICS. By Earle B. Brown. 645 pp. Reinhold, New York, 1965. \$25.00

by L. Marton

I must confess to a certain amount of prejudice against this book even before opening its cover. The prejudice originated from the title, *Modern Optics*. I find that the use of the word "modern" was unfortunate. Somehow, in my mind at least, "modern" means "up to date," and the question immediately arises: How long will it stay up to date? I am aware that the author probably uses the expression "modern" in the sense of contemporary, but I have known books that came out with "modern" in the title, and unfortunately, they didn't stay modern nor were they

modern at the time of publication.

My last remark doesn't apply to this book. It is up to date as of now, and its coverage is remarkably broad. The adjective "modern", however, makes you search for items that are not contained in other well known texts on optics, and there are relatively few items that can be picked out from the wealth of material presented in the book. In fact, I would only single out two items. One is the extensive chapter on the role of information theory in optics, and the other is the much shorter chapters on lasers and laser applications. The latter is rather superficial, and the author apologizes for it in the preface, whereas the information-theoretical part is exhaustive and kept at a reasonably high level. In fact, I am inclined to consider it the best part of the book.

All this brings us to the purpose of the book. For whom is it written? Usually a preface gives this type of information, and I tried to find it. The author says, "The guiding purpose of this book has been to give as broad a picture of optical technology as is possible within a reasonable bulk and to present the material at a technical level which will neither insult the intelligence of the intended reader nor burden him with unnecessary detail. A reasonable level of rigor has been attempted, but no attempt has been made to include proofs of many of the mathematical formulations." Problems have not been included. The book is not intended as a text for a classroom course in optics, but for self-study. "There is very little in this book that is not discussed in greater detail and with greater rigor elsewhere; the primary aim has been scope rather than uniqueness of subject."

The above definition of "scope" is rather negative, and the question arises: For whom is the book really written? The search for an indication leaves the reader rather frustrated. There are many items that are very good, others are mediocre and some are way down to downright naive. So, for instance, some of the introductory statements on

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Ontario.

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the nature and properties of light may cause some of the theoretical physicists to shake their heads. There are also items promised in the preface that are not treated according to the announcement in the preface. For instance, the preface says, "The Rayleigh limit was for decades an ultimate performance goal; today it is recognized as being a rather coarse criterion of quality." On page 259, the author says, "In an actual instrument, the resolution is not often that set by the diffraction limit of the aperture concerned. In most instruments, residual aberrations establish the resolution limit at a somewhat degraded level from the diffraction."

As another example, the preface says, "The classification of optical instrument types is believed to be unique, as is the treatment of reflections and image rotation in mirrors and prisms." I fail to see what is so unique about the presentation. Although the book is long and correspondingly expensive, there are certain items missing that one would expect in a "modern" text of optics. Although there is a long chapter devoted to optical measurement, there is no treatment, aside from a very short paragraph, of its uses in metrology. The fact that today the fundamental unit of length, the meter, is defined in terms of wavelengths, rather than in terms of the

distance between two bench marks, is ignored.

In editorial matters, I would like to complain of misspelling of both names and references. Many of these misspellings are rather systematic, indicating that they are not due to typographical error. So for instance, the name of Bloembergen is systematically misspelled Bloembergen. Another example of systematic misspelling is the name of Wien, who is always called Wein. As to the references, I deplore the system of giving unpublished reports as references. I think at one time the Optical Society made a definite request not to use such references.

The figures, which are very numerous, fall into two categories. The line drawings are almost uniformly good. Unfortunately, there are too many halftones containing photographs of instruments which are not informative at all. About 90% of these photographs could be discarded without impairing the usefulness of the book.

The book may serve as a useful introduction to the study of optics, particularly to engineering optics, but for serious study, quite a bit of added reading is necessary.

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The reviewer, who has done research in optics and electron physics for many years, is chief of international relations for the National Bureau of Standards.

PLASMA INSTABILITIES

AND

ANOMALOUS TRANSPORT

Edited by William B. Pardo
and Harry S. Robertson

*Physics Department, University of
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Proceedings of a conference on instabilities and anomalous loss processes in steady state plasmas, sponsored by the U.S. Atomic Energy Commission and held at the University of Miami, May 2-4, 1966.

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BOOKS RECEIVED

ACOUSTICS

Building Physics: Acoustics. By H. J. Purkis. 141 pp. Pergamon Press, New York, 1966. Paper \$2.95.

ASTRONOMY & ASTROPHYSICS

Physics of the Solar Corona. (2nd ed.) By I. S. Shklovskii. Translated by Louis Anderson Fenn. 475 pp. Pergamon Press, New York, 1965. \$18.50.

Methods of Orbit Determination. By Pedro Ramon Escobal. 463 pp. Wiley, New York, 1965. \$17.50.

BIOPHYSICS & MEDICAL PHYSICS

Diffraction of X-rays by Chain Molecules. By B. K. Vainshtein. 414 pp. Elsevier, New York, 1966. \$23.50.

Progress in Biocybernetics, Volume 3. Norbert Wiener, and J. P. Schade, eds. 258 pp. Elsevier, New York, 1966. \$15.75.

CHEMISTRY & CHEMICAL PHYSICS

Molecules, Crystals, and Quantum Statistics. By Enrico Fermi. Transl. from Italian by M. Ferro-Luzzi. Lloyd Motz, ed. 300 pp. W. A. Benjamin, New York, 1966. \$12.50.

Chemical Physics of Ionic Solutions. Conf. Proc. (Toronto, Canada, May 1964). B. E. Conway and R. G. Barradas, eds. 622 pp. Wiley, New York, 1966. \$25.00.

Rare Earth Research. Conf. Proc. (Phoenix, April 1964). LeRoy Eyring, ed. 749 pp. Gordon and Breach, New York, 1966. Professional edition \$19.50, reference edition \$39.50.

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