

REVIEW

Acoustical Holography. By E. E. ALDRIDGE. Merrow, 1971. 40 pp. £1.25 or \$4.00.

Strain Gauges. By E. J. HEARN. Merrow, 1971. 74 pp. £1.50 or \$4.75.

These two small books belong to the Merrow Practical Science Series, the aim of which is to give an introduction to a practical application of results obtained in fields of scientific research. The term "acoustical holography" describes a two-stage process, the first of which involves the recording of the distribution of the sound field scattered by an object and the second the formation of the images of that object in coherent light. Only fairly recently, during the last four or five years, has acoustical holography materialized as a method for the analysis of sound fields. It is thus premature at this time to expect any significant practical results, a fact markedly reflected in the first book. The majority of the experimental methods are still in the stage of development and the search for new methods is continuing. Presently, the development of acoustical holography is being held back by the lack of recording devices showing a large aperture, together with many resolution elements.

After a short historical introduction the author of *Acoustical Holography* provides a simple ray theory of hologram formation and image reconstruction, with the mathematical treatment kept at grammar-school level here and throughout the book. A chapter is devoted to the discussion of some systems for the production of acoustical holograms, including the use of liquid surface levitation and with great emphasis put on the scanned transducer system developed at Harwell, U.K., mainly for the purpose of evaluating the usefulness of acoustical holography in non-destructive testing. Some practical aspects of acoustical holography are treated in the next chapter, comprising the effects of unwanted modes of wave propagation in solids and problems related to scattering by the internal structure of materials. The last chapter contains an unduly short presentation of uses and possible developments in acoustical holography, and in the appendix the author presents a simplified analysis of synthetic aperture scans.

Generally, the book leaves the impression of being well-written and easy to read, but one-sided, owing to a heavy emphasis in the text and illustrations on results obtained by the author and his co-workers. The book is addressed to engineers and scientists who want a popular non-exhaustive introduction to a number of practical aspects of acoustical holography. The reader who wants a more thorough treatment of the subject of acoustical holography may refer for instance to D. Fritzler, Ultrasonic holography: a critical review, *IEEE Trans. Sonics and Ultrasonics*, Su-16, 1, 29, 1969.

The physical principle behind the strain gauge is known to every engineer and scientist working with experimental stress-analysis techniques. With the ever increasing demands for the control of stress variation and stress concentra-

tion, for instance within the aircraft industry, strain-gauge techniques have been developed to a high degree. The little book by E. J. Hearn gives a well-balanced and non-mathematical introduction to modern strain-gauge techniques.

The contents of *Strain Gauges* include a discussion of the basic principles behind wire and foil gauges, with a comparison between the advantages and disadvantages of the two gauge types. In an interesting and well-written chapter, different gauges for measurements in one direction and for simultaneous measurements in other directions are presented. This chapter and the subsequent discussion of factors influencing the gauge performance may be very useful for the selection of the right strain gauge for a given purpose. Two chapters are devoted to practical problems related to the mounting and the protection of the strain gauge, giving a clear picture of, for instance, the properties of a variety of strain-gauge mounting cements. Questions concerning high-temperature measurements, long-term testing and dynamic measurements from rotating components are treated in a number of chapters. Different bridge systems for the strain-gauge circuit are given a thorough treatment, together with basic information relevant to the choice between a d.c. or an a.c. system. One of the last chapters provides a short description of more specialized types of strain gauges. Here it would have been appropriate to give a more detailed treatment of the semi-conductor gauges in view of the increasing application of this gauge type.

A book of about 70 pages cannot be exhaustive in the sense of answering every question concerning strain gauges, but the subject is treated in an intelligible way, and, as is essential in a book in a practical science series, it gives the necessary information for the successful carrying out of a strain-gauge measurement even by a person who has never tried it before.

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