still important field. A somewhat longer article by K. Stewartson on the theory of unsteady laminar boundary layers is still quite brief; consequently the author barely touches on some of the theoretical work. Included is Rayleigh's problem for the plate, fluctuating boundary layers, and the boundary layer in a shock-tube type of flow. Similarly W. Chester's article on the propagation of shock waves along ducts of varying cross section is also brief and essentially devoted to only certain aspects of Chester's, Chisnell's, and Whitham's theories of recent date.

The two other surveys are longer and therefore more self contained and thorough. However, they are not as well written. One by K. Oswatitsch is entitled "Similarity and Equivalence in Compressible Flow." The equations of a perfect compressible fluid are reduced to their linear and second-order approximation and the similarity laws are deduced in a logical and comprehensive fashion. As one would expect from this author, the treatment of subsonic and transsonic flows is thorough, but the treatment of hypersonic similarity is much too sketchy.

The other long article on boundary-layer theory with dissociation and ionization, by C. Ludwig and M. Heil, is the one which will be, most likely, of interest to physicists. Whereas Oswatitsch discusses a classical field of gas dynamics in which results are fairly well established and known, Ludwig and Heil face squarely the problem of the flow of real gases over bodies at extreme speeds and temperatures where the simpler equations and properties of ideal gases no longer hold. Actually the boundary-layer problem is treated briefly near the end of the paper, and most of it is devoted to the problem of solving the Boltzmann equation and the equations of transport derived from it for the molecular properties of the dissociating and ionizing gas. Much of this article is based upon the authors' own work which has not been readily available in the literature in such detail. Although an extension of the kinetic theory approach of Chapman and Cowling, it is as yet the only way in which the equations of high-temperature gas dynamics can be set up. For the foundations of this new and active field of aerodynamics, this article of Ludwig and Heil's will be of considerable value.

Grundzüge der Elektroakustik (2nd ed.). By F. A. Fischer. 210 pp. Fachverlag Schiele & Schön GmbH, Berlin, 1959. DM 24.00. *Reviewed by Uno Ingard, Massachusetts Institute of Technology.*

As explained in the preface, the present book was initially written for the purpose of introducing the author's younger co-workers to the fundamentals of electroacoustics. The book was later modified on the basis of experience gained in teaching the subject in the Darmstadt Technische Hochschule, and it is this revised version that constitutes the second edition of the book. The careful selection and organization of the subject matter, the concentration on essentials,

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and the lucid style and insight have resulted in an excellent survey of the physical principles and elements of electroacoustics.

After an introductory discussion of mechanical and electrical oscillations and the analogies between them, the various stresses in matter produced by electric and magnetic fields are analyzed. The equations describing the coupling between the fields and the resulting motion of the medium are obtained and illustrated by simple examples. The utilization of these phenomena for the electromechanical transduction is then explored and the characteristics of different types of transducers are compared. A unified treatment of transducers in terms of electric-circuit analogs follows, and, after a chapter dealing with sound radiation from vibrating surfaces, the efficiency and sensitivity of the various transducers are determined. In the remaining chapters, basic questions of importance in the design of transducers related to (energy) transfer characteristics of the transducers are discussed. Thus, one chapter is devoted to the electrical and mechanical input impedances and others to the sensitivity and calibration of transducers.

The treatment is concise and clear and more systematic than in most texts in the field. In regard to the choice of subject matter, the only omission apparent to this reviewer is a discussion of the special problems involved in the generation and detection of very-high-frequency sound ("hypersound", frequencies above 10^9 cps).

The book should prove of interest not only to the newcomer who wants to know "what it is all about", but also to the specialist who feels that he is due for a concentrated, systematic review of the basic principles of electroacoustics. The extensive set of references that is given to books and original articles may also prove helpful.

Diffraction: Structure des Images. Influence de la Cohérence de la Lumière. Vol. 2 of Part 1, La Formation des Images, of Traité d'Optique instrumentale. By André Maréchal and Maurice Francon. 204 pp. Editions de la Revue d'Optique théorique et instrumentale, Paris, 1960. Paperbound $7.52.

Théorie et Calcul des Figures de Diffraction de Revolution. By Albéric Boivin. 573 pp. Centre de Recherches en Physique, Université Laval, Québec, Canada, 1960. $12.00. *Reviewed by Nicholas Chako, Queens College.*

CALCULATIONS of the image-formation properties of optical instruments are based mostly on the principles of geometrical optics. The theory, as well as its applications to the design of optical systems, is available in a systematic and unified form in several excellent treatises.[1] Although wave theory, based on the Kirchhoff-Fresnel theory, or its modified form,

[1] Herzberger, M. *Modern Geometrical Optics*, N.Y. (1958); Chretien, H. *Calcul des Combinaisons Optiques*, Paris (1959); Buchdahl, H. *Optical-Aberration Coefficients*, Oxford U. Press (1954).