$$g_2(\mu) = A\mu - \frac{A}{2} \int (1 - \mu^2) \log (1 - \mu^2) \, d\mu. \tag{13}$$

If the integration indicated in Eq. (13) is performed and the values of $g_1(\mu)$ and $g_2(\mu)$ used in Eq. (12), the expressions given in Eq. (7) are obtained.

REFERENCES

1. H. Poritsky, *Stress fields of axially symmetric shafts in torsion and related fields*, Proc. Symposia Appl. Math., **3**, 163-186 (1951).

BOOK REVIEWS

Description of a magnetic drum calculator. By The Staff of the Computation Laboratory. Harvard University Press, Cambridge, 1952. 318 pp. $8.00

This book is one of a series put out by the staff of the Computation Laboratory of Harvard University and describes the Mark III calculator. This machine was completed in March of 1950 and was then moved to the Naval Proving Ground at Dahlgren, Virginia.

The book itself is a detailed description of this machine and is of principal interest to those persons who are immediately associated with the machine. It combines both an engineering and a mathematical description of the device.

The text is extremely well illustrated both with photographs and with schematics of the principal organs of the machine.

To illustrate the coding of problems for the machine there is a chapter which contains among other things the programming for four illustrative examples.

The text is undoubtedly an invaluable aid to those immediately concerned with the operation and programming of problems for the Mark III calculator.

H. H. GOLDSTINE

Introduction to the theory of plasticity for engineers. By Oscar Hoffman and George Sachs. McGraw-Hill Book Company, Inc., New York, Toronto, London, 1953. xib + 276 pp. $6.50.

As one would expect on the basis of the authors' well deserved reputation their book contains an excellent exposition of the technological application of plasticity. Major emphasis is placed on the approximate solutions to problems of rolling, extruding, drawing, etc. in which the material is assumed to be ideally plastic and the true three dimensional character of the flow is not taken into account. Appreciable space is also devoted to the elementary classical problems of the thick-walled shell and tube and to the rotating cylinder and disk. Although the text opens with a discussion of stress and strain tensors and considers a stress space, the discussion of stress-strain relations and experimental data is brief and is essentially confined to the maximum shear stress and octahedral shear stress criteria. The extensive modern literature on stress-strain relations in the plastic range is, in the main, ignored. Also, except for a short section on two-dimensional plastic flow problems, little of the classical mathematical theory of plasticity is treated. No mention is made of plastic waves nor of the theorems or applications of limit analysis and design. The latter would be especially useful in evaluating some of the results obtained in the approximate solutions which are treated.

D. C. DRUCKER

Tensor calculus. By Barry Spain. Oliver and Boyd, Edinburgh and London, Interscience Publishers, Inc., New York, 1953. viii + 125 pp. $1.55.

In this readable little book, the author manages to cover a surprisingly large amount of material—tensor algebra and differentiation, and introductions to differential geometry, elasticity, and relativity. This is accomplished by using a very concise style of writing in which some aspects of a subject are presented only formally. The book should be of value to both mathematicians and engineers.

The following material is covered in the text. Tensors are defined by their transformation laws, and addition, multiplication, contraction, and the quotient law are discussed. The metric tensor and the principal directions of a second order symmetric tensor in n-dimensional Riemannian space are studied. After formally introducing the Christoffel symbols, the covariant derivative is defined and its properties are determined. Geodesics, parallelism, and the curvature tensor of n-dimensional Riemannian space are discussed. In addition, a brief survey of three-dimensional differential geometry is given (Frenet formulas for curves in space, the normal vector of a surface, the second fundamental tensor of surface, etc.). In the section on elasticity, orthogonal transformations, rotations, infinitesimal strain, the compatibility relations, the stress tensor, Hooke's law, and the equilibrium relations are studied. A brief introduction is given to curvilinear coordinates and isotropic tensors. Finally, an introduction is given to the special theory of relativity and then the general theory, including the Schwartzschild line-element and the Einstein and De Sitter universes, is discussed.

<div align="right">N. Coburn</div>

The theory of homogeneous turbulence. By G. K. Batchelor. The University Press, Cambridge, 1953. xi + 197 pp. $5.00.

This book gives an excellent account of the modern developments in the statistical theory of homogeneous turbulence. The author has purposely chosen to omit all work requiring a Lagrangian description, since the methods used are very much different from those in the Eulerian description. Problems like diffusion are therefore omitted in the present book. It is also clear from the title of the book that a treatment of shear flow is not to be found in the present volume. The omission of these two important aspects of turbulence might discourage some people chiefly interested in applications. However, it is generally agreed among workers in turbulence that a treatment of the statistical theory of homogeneous turbulence would lead to the best understanding of our established knowledge and basic concepts.

Chapter I gives a general description of the problems involved in the statistical theory of turbulence, and a brief history of the subject, beginning with Taylor's work of 1935. Chapter II describes the methods used in the mathematical representation of the field of turbulence, including a discussion of the method of taking averages and the relation between correlation and spectral tensors. Chapter III applies these concepts to the treatment of specific velocity correlations.

Discussion of the dynamical aspects of turbulence begins with Chapter IV, where a set of linear problems are collected and treated in some detail. In Chapter V, the general aspects of the decay of homogeneous turbulence are treated, including a discussion of the final period of deday, where linearization is again justified.

The universal equilibrium theory of A. N. Kolmogoroff is described in Chapter VI. General discussions of the energy transfer is included here. The specific spectrum proposed by Townsend is, however, postponed to Chapter VII where Heisenberg's form of the energy spectrum (as calculated by Chandrasekhar) is also discussed. The concept of self-preservation during the process of decay is treated in Chapter VII. The author presents some limited experimental information before introducing the general concept, although the general ideas were conceived and used theoretically for the prediction of law of decay before these detailed experimental information were available. It is quite likely that the general concepts will hold in other cases not yet examined experimentally.

The final chapter gives a discussion of the probability distribution of the velocity fluctuation and the consequences drawn from the approximately Gaussian character of the joint velocity distribution at several points. The book ends with an excellent bibliography.

<div align="right">C. C. Lin</div>