down. Qualifications of the theorems are carefully stated. The development of this aspect of the theory of plasticity has reached relative maturity, and this review not only summarizes the material effectively but also gives the historical perspective of the development.

The presence of even the simplest boundaries in an elastic body with some finite dimensions introduces great complications in the behavior of elastic waves; in particular, there is usually dispersion. Because of the widespread use of high-frequency mechanical systems, such as crystal oscillators, marked interest has been shown in this subject in recent years. W. A. Green treats one aspect of this matter in a rather individualistic article on the dispersion of elastic waves in bars. The simplest case is the infinite bar of circular cross section, for which a formal solution was given by Pochhammer as early as 1876, but the complicated results have received quantitative study only in recent years. The dispersion curves for axial, torsional, and flexural waves consist, in each case, of an infinite number of branches. Exact solutions for cross sections other than circular have not yet been found. Consequently there has been much interest in approximate solutions, which are discussed at some length in the article. Where possible, comparisons are made with the lowest branch of the Pochhammer solution, but no attention is drawn to the fact that most of the theories furnish no approximations to the higher branches. The article concludes with an interesting discussion of the complications introduced when the Pochhammer theory is enlarged to include more than one nodal plane through the axis of the bar.

The account of the dynamical theory of thermoelasticity, presented by P. Chadwick, is as lucid and readable as any I have seen. A derivation of the field equations and the linearized constitutive relations in an isotropic body is followed by an extended account of plane harmonic thermoelastic waves in the manner of Biot. Lockett's analysis of thermoelastic Rayleigh waves, a treatment of the thermoelastic Pochhammer-Chree problem for an infinite circular cylinder, and a treatment of both axially and radially symmetric problems are presented. Following Biot, the author derives the constitutive relations in terms of the variables associated with the free energy—that is, the strain (or displacement) and the temperature. It is perhaps regrettable that the utility of the remaining thermodynamic functions is not exploited. For instance, consideration of the enthalpy leads directly to equations in the stress and (through the entropy) the heat flux, a very convenient choice in a problem such as that of a metallic rod driven by pulsed radiation incident on one end.

The concise review of continuous distributions of dislocations by B. A. Bilby, one who was most active in founding the theory, deals almost exclusively with the pertinent kinematics—that is, with formulation and physical interpretation of the relevant geometry. Since the discussion covers a wide variety of investigations, sometimes very briefly, it is impracticable to describe the contents in detail. Fundamental in the theory is a non-Riemannian geometry, involving an asymmetric affine connection. The antisymmetric part of this connection describes the distribution of dislocations. Curves everywhere tangent to crystallographic vectors are paths in this geometry, paths being analogs of the straight lines in Euclidean geometry. With this geometry and conventional kinematics, one can describe macroscopic "shape" deformation, lattice distortion, and deformation associated with introduction or movement of dislocations. These ideas are developed in some detail and correlated with dislocation theory. This approach promises to play an important role in the development of the mechanics of crystalline solids, and the present review provides a good starting point for those interested in learning what it entails.

The number of significant solutions to three-dimensional problems in elasticity is small except where the number of space variables can be reduced by conditions of axial or radial symmetry. It is therefore welcome to see an extension to asymmetric problems of the powerful method of integral transforms associated with Sneddon. R. Muki discusses elastic and thermoelastic (steady state) problems associated with the semi-infinite solid and the thick plate. Specific cases include the inclined rigid cylindrical punch and arbitrary tangential loading on the semi-infinite solid. Both loaded areas are circular, and Hankel transforms are used. Two thermal stress problems are solved for the thick plate with circular heated areas.

Particularly noteworthy are the uniformly excellent bibliographies attached to each article.

I hope that succeeding volumes in this series will maintain the high standard set by the first.

I am indebted to J. L. Ericksen, Johns Hopkins University, for reviewing the article on continuous distribution of dislocations and to my colleagues, R. S. Marvin and Martin Greenspan, who were kind enough to review the articles on viscoelasticity and thermoelasticity, respectively.

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The American Civil Engineer. Origins and conflict. Daniel Hovey Calhoun. Technology Press and Harvard University Press, Cambridge, Mass., 1960. xiv + 295 pp. Illus. $5.50.

This history covers the tribulations of the civil engineer in the United States from the colonial era until the 1840's, when "civil engineers had become a definite occupational group." The author is most concerned with the period from 1816 (the beginning of the New York state canal system) through the depression of 1837–46; apparently the depression gave the engineer the leisure necessary to reflect on his calling and to recognize the need for a professional society.

The problem of defining his work was approached scientifically by the engineer himself as early as 1830 when Amos Eaton subdivided the work into *ochetology, odology, mylology*, and *stereology*! But, as Calhoun shows, the engineer found it difficult in practice to differentiate himself from capital, on the one hand, and labor, on the other. In my opinion, Calhoun's analysis of the "trend" of things is unduly complex. In essence, it seems that the engineer's problem was to become a sufficiently numerous species to demand definition, and this was accomplished, thanks to the proliferating transportation projects sponsored by the government in the early 19th century.

All this is told at somewhat greater length than necessary and with an emphasis on socioeconomic analysis which effectively submerges the undoubted romance of civil engineering in those days. But, in an area heretofore almost entirely given over to legend, it is refreshing to encounter a report so solidly based on fact and footnote.

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