sional explosions probably occur by the million, so that explosions from denting impacts are fortunately of extremely low frequency. With U. S. bomb-type ammunition during the war there have been only about 20 incidents probably ascribable to this cause; but they have included particularly bad ones which, by one rough estimate, involved total property losses of many millions of dollars, as well as thousands of deaths and injuries.

Such occurrences seem more frequent with the more sensitive explosives; but TNT and amatol, as well as RDX explosives, have all been involved. Very thin-walled containers, such as those of depth bombs and torpedo war heads, appear relatively more susceptible. One may surmise that a trivial local ignition is produced by certain unidentified critical conditions of denting, and that burning to partial or complete detonation is peculiarly favored by confinement afforded by the dented, but unbroken, container.

Adequate understanding of the mechanism of this phenomenon apparently requires further fundamental research, which possibly may result from more widely disseminated knowledge of the existence of "container-dent sensitivity" and from fuller appreciation of its practical importance.

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Book Reviews

Mathematical theory of elasticity. **I. S. Sokolnikoff (with the collaboration of R. D. Specht). New York: McGraw-Hill, 1946. Pp. ix + 367. (Illustrated.) $4.50.**

Although the scientific literature now contains a considerable number of treatises and textbooks on the theory of elasticity, this book will be welcomed for its mathematical rigor and its stimulating and refreshing approach to the subject. Rather than following the more conventional procedure of developing the fundamental stress and strain concepts from the coordinate point of view, the first two chapters make free use of tensor analysis. While thus achieving abbreviated expressions for strain and stress combinations, it has the additional advantage of giving the student a more general conception of the physical meaning of these quantities. The notation employed for strain is quite similar in most respects to that in common use in this country. The stress notation, however, differs from current American practice by use of the Greek letter τ with proper subscripts for both normal and shearing stresses. It is more common in this country to use the Greek letter σ for normal stresses and τ for shearing stresses. This, however, should cause no appreciable difficulty.

The real advantage of adopting the tensor notation becomes more evident from the discussion of the stress-strain relations in Chapter 3. Hooke's generalized law in tensor notation is expressed by one equation, whereas in coordinate form six equations are required. Similarly, the six compatibility equations in terms of stress are written as one equation in tensor form. The same chapter contains a discussion of equilibrium, strain energy, boundary-value problems, and St. Venant's principle.

The discussion of these essential fundamental concepts is accomplished in less than 100 pages. Although tensor notation is used for the most part, the equivalent coordinate expressions are usually also listed. The remaining portion of the book, comprising applications of the theory, abandons the tensor notation where, as expressed by the author, "the economy of thought achieved by tensor symbolism is in some doubt," and the usual scalar methods adopted. For those familiar with the basic relationships in the theory of elasticity, the remaining portion of the book should be easy to follow even if they are unfamiliar with tensor notation.

Chapter 4, 160 pages in length, gives an up-to-date and comprehensive treatment of the extension, torsion, and flexure of homogeneous beams. The attention of American scientists and engineers is also called to various recent publications in this field by a number of Russian authors, and several sections of the chapter follow the prize-winning work of N. I. Muschelišvili as well as the original contributions of the author. The use of conformal mapping, complex variables, the formulas of Schwartz and Poisson, and membrane analogies is discussed.

The last chapter of the book is devoted to variational methods, including the theorems of minimum potential energy, work, and reciprocity. Galerkin's method, the Rayleigh-Ritz method, and the method of finite differences are also included. In this chapter the relaxation method of Southwell is only mentioned. Since the latter procedure has proved to be of great use in elasticity problems, a treatment of this method would have been a valuable addition.

A very worth-while feature in the nature of a summary of formulas is contained in the Appendix.

This book is a welcome addition to the literature on the subject and will be of great use to students and engineers working in this field. It is mentioned in the Preface that a companion volume dealing with two-dimensional problems of elasticity, plates, and shells may be forthcoming. It is hoped that the author will be encouraged to prepare this supplementary treatment of the present excellent book.

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