since the proof of validity is often provided by inference and comparison of fringe patterns only.

With the help of a Periphery Camera which is capable of developing a 360 deg curved surface into a plane by successively photographing a narrow strip at a time, the author was able to apply the shadow moiré and the reflected image moiré methods to shells. However, some errors seem to be involved here also. First of all equation (8.4) (p. 322) is incomplete. It should read

$$\Delta z = \frac{p}{\tan i + \tan \beta}$$

where the parameters are as defined in the text. Second, it is difficult to see how the methods can be used to determine the initial curvature of a cylindrical or conical shell, for the very function of a Periphery Camera is to render the shell curvatureless. Furthermore, the initial pattern of a cylinder by shadow moiré (which gives depth contours) does not consist of equidistant fringes, and these fringes do not move when the cylinder is rotated on the turntable of a Periphery Camera.

The chapter on moiré extensometers is well written. Five different designs are included, all based on the intrinsic properties of moiré fringes. The part on experimental errors and laboratory techniques is also well written and provides a great deal of useful information for practitioners.

All in all this is a very useful book. It covers a very broad spectrum of moiré methods and its bibliographical listings are invaluable to research workers as well as practicing engineers. However, the reader should exercise caution as well as be selective in extracting the information.

Since the publication of this book there has been a large amount of advanced work done on moiré methods. Notably the fringe multiplication and shifting techniques, the extension of the in-plane and the Ligtenberg moiré methods to general dynamic problems, the generalization of the shadow moiré method to include point source illumination and point observation, etc. Most of the information can be found in the subsequent issues of *Experimental Mechanics*.

Surface Mechanics

Surface Mechanics. By F. F. Ling. John Wiley & Sons, New York. 1973. 320 Pages, Cost $19.95. Copyright February 16, 1973.

REVIEWED BY L. E. GOODMAN[3]

The appearance of a monograph surveying those aspects of the physics of material surface behavior that can be successfully treated by the methods of continuum mechanics is most welcome. Indeed, the recent growth of activity and of journal publication in this area would justify several specialized summarizing treatments. *Surface Mechanics* should find a place in every university engineering library.

The chapters of Professor Ling's book cover heat conduction near the surfaces of solids, the measurement of surface temperatures, classical elastic stress analysis of bodies subjected to (usually normal) pressures over portions of their surfaces, thermoelasticity, viscoelastic and plastic punch problems, roughness of surfaces, and surface chemical effects. There is an introductory chapter that presents the governing field equations of classical continuum mechanics and an Appendix on singular integral equations. The mode of development for the main sections consists in first obtaining formal solutions to the field equations for solids of various simple shapes subject to thermal or mechanical surface loadings. The linear integral transform appropriate to the geometry of the solid is employed consistently for these solutions. Next, the fundamental solutions are illustrated by selected applications taken from the journal literature. Some of these are discussed in detail.

The strongest sections are those dealing with thermal effects, where the author is describing work to which he has himself made major contributions. These sections take up the junction thermal condition at a moving interface (describing contributions of Blok and of Saibel), the effects of surface temperature transients (Bowden and Thomas), and the convective half space in two and three dimensions with moving heat source. The section on classical elasticity suffers through brevity. Mindlin's 1949 analysis of the tangential compliance of elastic bodies in contact and its many offshoots are not mentioned. It must be said, too, that the format of this book does not meet the high standards usually associated with the publisher. There are many typographical errors. Equations A.4 and A.5 (p. 302), for example, are incorrectly printed. The reader who wishes to pursue matters further will therefore need to refer in many cases to the original Journal article in the list of 183 selected references.

Surface Mechanics is intended for a reader with considerable background in theoretical continuum mechanics. Such readers—graduate students and those carrying out research in particular areas of tribophysics—will be most interested in this exposition of research results. It exhibits in a concise manner the wide range of applications that are encountered in this field.

Theory and Analysis of Plates

Theory and Analysis of Plates, Classical and Numberical Methods. By R. Szilard. Publication January 24, 1974. Publishers: Prentice-Hall, Inc., Englewood Cliffs, N. J. 07632. Cost: $25.00. Cloth. 724 Pages.

REVIEWED BY W. A. NASH[4]

The author has produced an excellent exposition of analysis and design techniques pertinent to static as well as dynamic behavior of thin plates. Both the elastic and plastic ranges of action are considered. Classical closed-form methods of solution as well as series approaches are outlined in detail and applied to a number of illustrative problems involving circular and rectangular plates with a variety of boundary conditions. Orthotropic plates, plates of variable rigidity, plates on elastic foundations, and continuous plates are treated by exact and approximate analytical methods, including finite differences and finite elements for a number of cases of practical interest. Energy methods and generalized variational techniques are developed from fundamentals and applied to a number of problems involving plate bending and buckling.

Dynamic analysis of thin plates is explored through investigations of free and forced vibrations of plates of various contour. Numerical methods are also applied to this category of problems. Stability of initially flat plates is examined using energy methods as well as finite differences and finite elements. Postbuckling behavior of plates as well as ultimate load-carrying capacities are investigated, and many examples of yield-line analysis are provided.

These portions of the book, including many problems at the end of each section, make it suitable for use by students as well as engineers in need of basic methods of analysis. An Appendix of nearly 100 pages offers the designer ready reference to maximum deflections and stresses in a wide variety of problems involving plates of various contours subject to many different static and dynamic loadings. In summary, the presentation is well suited for use by both students and practicing engineers.

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