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Book Reviews

Limit Analysis of Structures at Thermal Cycling. By D. A. Gokhfeld and O. F. Cherniavsky. Sijthoff and Noordhoff, The Netherlands, 1980, Pages xxviii–537. Price $110.00.

REVIEWED BY PHILIP G. HODGE, JR.[1]

The contents of this book can be roughly separated into three parts: basic theory and simple examples, applications to nontrivial problems, and advanced theoretical concepts. The first part is separated into five chapters beginning with a presentation of fundamental ideas in terms of simple two-and three-bar trusses followed by general mathematical statements and proofs of the theorems of limit analysis and shakedown. Chapter 3 discusses the value and some of the severe limitations of generalized variables in shakedown analysis. Chapters 4 and 5 give simple illustrative examples of the statical and kinematical theorems, respectively, including many computational details.

The second part contains one chapter each devoted to turbines, plates, and shells. A great deal of detail is given and comparisons are made with some experimental results. Both circular and rectangular solid plates are covered in Chapter 7, and a section on perforated plates is included. Chapter 8 includes cylindrical, conical, and spherical shells together with sections on a liquid fuel rocket engine and a nuclear fuel element.

The final part begins with a chapter exploring the case of thermal cycling under negligible mechanical loads. Several examples of rachetting and incremental thermal buckling are considered. Chapter 10 is on shakedown in contact problems and the final chapter discusses possible simplifications in proceeding directly to a steady stress cycle in investigating shakedown.

The book is clearly designed for an engineering audience. Basic ideas are presented first in terms of simple examples. Two- or three-dimensional symbolic diagrams are used to present fundamental ideas in a geometric terminology. Mathematics is kept as simple as possible. Index notation is used, but explained, and the reader need only be familiar with such classical concepts as summations, inequalities, and linear differential equations.

In the second part the emphasis is on solution of real problems. This is particularly true of the turbine disks in Chapter 6 and some of the shell-type structures in Chapter 8.

The presentation of the material is excellent. Figures are extremely clear and easy to read. The text is obviously written by someone to whom English is not a native language, but this results only in a slight awkwardness of sentence construction and inappropriate use (or nonuse) of the definite article. The meaning is always perfectly clear, both in total and sentence-by-sentence. Over 300 references are given to both the Russian and Western literature. The index appears to be adequate.

In summary, this book appears to do a thorough job of covering the current state of knowledge about mechanical shakedown theory and application, and to extend the ideas, often for the first time, to thermal loading as well.

Fracture and Fatigue. Edited by J. C. Radon. Pergamon Press, New York. 1981. Pages ix–488. Price $60.00.

REVIEWED BY: J. W. HUTCHINSON[2]

This volume of almost 500 pages is a collection of papers on fracture mechanics which make up the Proceedings of the Third Colloquium on Fracture, held at Imperial College, London, in September, 1980. The meeting was organized by the European Group on Fracture. The book is subdivided into three main headings: elastoplastic fracture mechanics, micromechanisms of fracture, and thin-sheet fracture mechanics. For the most part, the papers represent the state of the art in fracture analysis and testing as practiced in Europe, including the United Kingdom.

Stable crack growth receives more attention than any other single topic. It is treated in several review papers, a number of experimental papers on tearing resistance, and in several analytical papers. This subject has seen rapid and parallel developments in both the United Kingdom and in the United States, and this volume reveals that there appears to be less divergence in these two approaches than was evident in some of the earlier developments in fracture mechanics. The section on thin sheets also contains papers on tearing resistance, which is particularly welcomed since fracture under plane stress conditions tends to get short shrift in this country.

The volume includes a survey paper on recent work on micromechanisms of fracture. It also includes several papers on mixed mode fracture and on fatigue. Most of the papers are oriented toward the fracture of metals, but one paper does deal with stable crack growth in ceramics. Taken together, this collection of papers indicates a vital European fracture community with much in common with its counterpart in the United States.

Computational Methods in Structural Dynamics. By L. Meirovitch. Sijthoff & Noordhoff, The Netherlands. 1980. Pages xiv–439. Price $35.00.

REVIEWED BY P. P. FRIEDMANN[3]

During the last two decades the field of structural dynamics has been very active, mainly due to the combined influence of

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