(112 pages) presents dynamic aeroelasticity starting with the basic principles and equations for the typical wing section, and progressing to the analysis of complex structures and pipe flows. Chapter 4 (108 pages) is on nonsteady aerodynamics of lifting and nonlifting surfaces. It starts with the basic fluid equations and takes the reader through subsonic and supersonic flows over airfoils and wings. Consistent with the current state of the art, unsteady transonic flows are described by approximate methods.

Chapter 5 (14 pages), by Professor Sisto, discusses stall flutter. It gives an overview of the phenomena including a nonlinear mechanics description. In Chapter 6 (46 pages), Professor Scanlan gives a valuable and unique exposition of the aeroelastic problems of civil engineering structures such as divergence, vortex shedding, and flutter of bridges, and galloping of cables. Chapter 7 (56 pages) by Prof. Curtiss is on the aeroelastic problems of rotorcraft and gives a brief description of blade dynamics, stall flutter, and blade motion/body coupling. In Chapter 8 (28 pages), Prof. Sisto describes aeroelastic problems in turbomachines highlighting the special problems encountered in axial flow compressors.

Appendix I (8 pages) by Prof. Dowell, is a primer for structural response to random pressure fluctuations and gives a good resume of an application of modern spectral analysis techniques. Appendix II (38 pages, Prof. Dowell) gives some example problems that are pertinent to Chapters 2–4 and their solutions.

This book gives a good exposition of basic principles and a good overview of the diverse field of aeroelasticity from a modern point of view. As the title indicates, it is primarily directed as a textbook rather than to the practitioner. It supplements reference [1] rather than replacing it, however, as the range of topics considered are somewhat different. Further emphasis might have also been given to testing techniques and experimental results. The book is recommended and Profs. Dowell, Sisto, Scanlan, and Curtiss are to be commended for this addition to the literature.

References

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5 Petre, A., *Theory of Aeroelasticity, Vol I Statics, Vol. II Dynamics*. (In Romanian) Bucharest, 1966.

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The Calculus of Variations and Optimal Control. By George Leitmann. Plenum Press, New York, 1981, 311 pages. Price $35.00.

REVIEWED BY DANIEL TABAK[4]

A large variety of books covering the topics of calculus of variations and optimal control exists. Thus, a reader may naturally ask: what is so special about this book that would justify its addition to the practically oversaturated market? Once the book is read, the answer to this question becomes simple: it is not the contents of the book, but the way the book is written that makes it so special and outstanding. Before elucidating on this point, let us first look at the contents.

The book covers the basic theory of the calculus of variations and optimal control. It is accordingly divided into two parts; Part I, Calculus of Variations (Chapters 1–8) and Part II, Optimal Control (Chapters 9–17). Part I includes the topics of necessary conditions for an extremum, integration of the Euler-Lagrange equation, the inverse problem, the Weierstrass and Jacobi necessary conditions, and the corner conditions. Part II includes the topics of optimality principle, optimal trajectories, Maximum Principle, special cases of optimal control problems, sufficient conditions, feedback control, and optimization with vector-valued cost. The last topic makes the book just about unique contents-wise; very few books touch on it. Practically all chapters contain illustrative examples and exercises for students. A list of references, an extensive bibliography and and index are given at the end of the book.

The book contains a rigorous mathematical presentation of the basic theoretical results. At the same time it is very clearly written and easy to learn from and to teach with. (In fact, it has already been successfully used by this reviewer as a self-paced text for graduate students.) Its numerous solved examples and clear figures make it even more attractive to the reader. It contains some specific economic and aerospace application examples of optimal control implementation.

It is this particular combination of mathematical rigor with an excellent tutorial lucidity that makes the book so unique and its use so widely recommendable. The book can serve as a excellent primary text in optimal control for graduate students. Since it contains examples from many diverse areas, it is not restricted to any particular discipline. It can be used by students of engineering, mathematics, operations research, economics, and other related areas.

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Mechanics of Wave Forces on Offshore Structures. By T. Sarpkaya and M. Isaacson. Van Nostrand Reinhold, New York, 1981. pp. xiv–651. Price $37.50.

REVIEWED BY J. V. WEHAUSEN[5]

The authors' purpose, as stated in the preface, is to bring into one place the extensive and widely dispersed literature on wave forces on offshore structures. They speak of the work as a text and suggest that it could be used for a graduate course in ocean engineering. Have they succeeded? In my opinion they have, provided that one takes account of their approach to the problem of expounding a large amount of material.

The book is divided into nine chapters, a short introduction discussing the nature of the engineering problems encountered in analyzing ocean structures, another short chapter reviewing the fundamental equations for an incompressible Newtonian fluid, and then seven chapters with the following titles: "Flow Separation and Time-Dependent Flows," "Wave Theories," "Wave Forces on Small Bodies," "Wave Forces on Large Bodies," "Random Waves and Wave Forces," "Dynamic Response of Framed Structures and Vortex-Induced Oscillations," and "Models and Prototypes."

Chapters may be read reasonably independently of one another, but may be considered self-contained only if one comes to the book with "a good background in mathematics and fluid mechanics," a prerequisite stated in the preface. With such a background, any serious reader will find this an invaluable guide to the current literature. Each chapter is followed by an extensive bibliography in which, with few exceptions, complete author, title, and source data are given, thus making it easy for the reader to locate referenced papers. Although developments within the chapters are not sufficiently detailed to allow one to avoid going back to the

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