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Book Reviews

Perturbation Methods in the Computer Age

D. C. Wilcox, DCW Industries, Inc., La Cañada, CA, 1995, 224 pp., $60.00; Solutions Manual, 164 pp., $40.00

In a little over 200 pages, this book provides an excellent introductory presentation of selected topics in perturbation methods. The book contains a large number of homework problems; a solutions manual is also available. As a text, it is the proper length for a single semester course in aerospace engineering at the senior or graduate level. The solutions manual is comprehensive and quite helpful.

There are four chapters and three appendices. The first chapter is a brief introduction that defines the various order symbols and related material. Chapter 2 deals with asymptotic expansion of integrals by means of integration by parts, Laplace's method, the method of stationary phase, and the method of steepest descent. The longest chapter is concerned with singular perturbation theory as it applies to algebraic equations, and to ordinary and partial differential equations. Multiple-scale analysis, including the method of averaging and the WKB method, constitute the final chapter. As was the author's intent, there is an in-depth discussion of the many advantages of combining a perturbation analysis with computational methods.

A knowledge of functional analysis is not required, but a background in complex variable theory is essential. Worked examples, both of a purely mathematical nature as well as of engineering interest, are provided. The material covered is not unique to this book, but it is well organized and written with a clear and readable style. It should find a wide audience among analytically oriented aerospace engineers. After mastering Wilcox's book, the reader or student is well prepared to proceed to a more advanced and comprehensive treatment such as found in *Advanced Mathematical Methods for Scientists and Engineers* by Bender and Orszag.

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