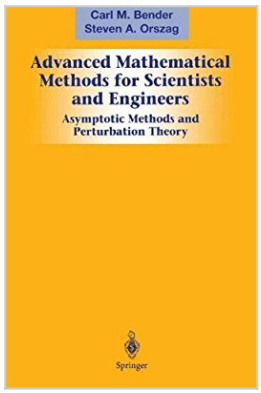

Advanced Mathematical Methods for Scientists and Engineers: Asymptotic Methods and Perturbation Theory

By Carl M. Bender, Steven A. Orszag

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A clear, practical and self-contained presentation of the methods of asymptotics and perturbation theory for obtaining approximate analytical solutions to differential and difference equations. Aimed at teaching the most useful insights in approaching new problems, the text avoids special methods and tricks that only work for particular problems. Intended for graduates and advanced undergraduates, it assumes only a limited familiarity with differential equations and complex variables. The presentation begins with a review of differential and difference equations, then develops local asymptotic methods for such equations, and explains perturbation and summation theory before concluding with an exposition of global asymptotic methods. Emphasizing applications, the discussion stresses care rather than rigor and relies on many well-chosen examples to teach readers how an applied mathematician tackles problems. There are 190 computer-generated plots and tables comparing approximate and exact solutions, over 600 problems of varying levels of difficulty, and an appendix summarizing the properties of special functions.

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Editorial Review

Review

"This book is a reprint of the original published by McGraw-Hill ef [MR0538168 (80d:00030)]. The only changes are the addition of the Roman numeral I to the title and the provision of a subtitle, "Asymptotic methods and perturbation theory". This latter improvement is much needed, as the original title suggested that this was a teaching book for undergraduate scientists and engineers. It is not, but is an excellent introduction to asymptotic and perturbation methods for master's degree students or beginning research students. Certain parts of it could be used for a course in asymptotics for final year undergraduates in applied mathematics or mathematical physics.

This is a book that has stood the test of time and I cannot but endorse the remarks of the original reviewer. It is written in a fresh and lively style and the many graphs and tables, comparing the results of exact and approximate methods, were in advance of its time. I have owned a copy of the original for over twenty years, using it on a regular basis, and, after the original had gone out of print, lending it to my research students. Springer-Verlag has done a great service to users of, and researchers in, asymptotics and perturbation theory by reprinting this classic." (A.D. Wood, Mathematical Reviews)

Users Review

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