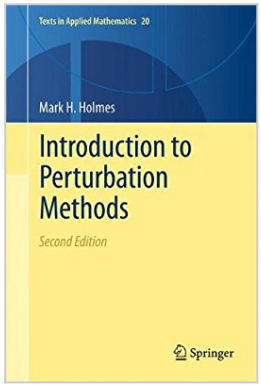

Introduction to Perturbation Methods (Texts in Applied Mathematics)

By Mark H. Holmes

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This introductory graduate text is based on a graduate course the author has taught repeatedly over the last ten years to students in applied mathematics, engineering sciences, and physics. Each chapter begins with an introductory development involving ordinary differential equations, and goes on to cover such traditional topics as boundary layers and multiple scales. However, it also contains material arising from current research interest, including homogenisation, slender body theory, symbolic computing, and discrete equations. Many of the excellent exercises are derived from problems of up-to-date research and are drawn from a wide range of application areas.

One hundred new pages added including new material on transcedentally small terms, Kummer's function, weakly coupled oscillators and wave interactions.

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Introduction to Perturbation Methods (Texts in Applied Mathematics) By Mark H. Holmes Bibliography

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Editorial Review

Review

From the reviews of the second edition:

“The book is composed of 6 chapters with the topics of Introduction to Asymptotic Approximations, Matched Asymptotic Expansions … Second-Order Difference Equations, and Delay Equations. … enjoyed reading this book that has a refreshing flavor to perturbation methods. … The book can be used for both undergraduate and graduate courses in mathematics and physics and also in aerospace, electrical and mechanical engineering areas. Those working in industry will find this book useful in addressing some of the nonlinear problems in real-world situations.” (D. Subbaram Naidu, Amazon.com, March, 2013)

“This introduction to perturbation methods is a rich, well-written … textbook. … Students and their instructors will benefit greatly from this author’s evident broad understanding of applied mathematics and mechanics and his uncommon pedagogical abilities and scholarship. … Holmes’s text will be tough to beat for the ambitious and talented.” (Robert E. O’Malley, Jr., SIAM Review, Vol. 55 (3), 2013)

“This is the second edition of the well-known book widely used by researchers in applied mathematics and physics, engineers, graduate and postgraduate students. Its distinctive feature is that it includes a variety of substantive physically motivated examples on various kinds functional equations and also exercises both in and at the end of every chapter.” (Boris V. Loginov, zbMATH, Vol. 1270, 2013)

From the Back Cover

This introductory graduate text is based on a graduate course the author has taught repeatedly over the last twenty or so years to students in applied mathematics, engineering sciences, and physics. Each chapter begins with an introductory development involving ordinary differential equations, and goes on to cover more advanced topics such as systems and partial differential equations. Moreover, it also contains material arising from current research interest, including homogenisation, slender body theory, symbolic computing, and discrete equations. Many of the excellent exercises are derived from problems of up-to-date research and are drawn from a wide range of application areas.

For this new edition every section has been updated throughout, many only in minor ways, while others have been completely rewritten. New material has also been added. This includes approximations for weakly coupled oscillators, analysis of problems that involve transcendentally small terms, an expanded discussion of Kummer functions, and metastability. Two appendices have been added, one on solving difference equations and another on delay equations. Additional exercises have been included throughout.

Review of first edition:

"Those familiar with earlier expositions of singular perturbations for ordinary and partial differential equations will find many traditional gems freshly presented, as well as many new topics. Much of the excitement lies in the examples and the more than 250 exercises, which are guaranteed to provoke and challenge readers and learners with various backgrounds and levels of expertise."

(SIAM Review, 1996)

About the Author
Mark Holmes has written a number of successful textbooks and is Professor at Rensselaar Polytechnic Institute.

Users Review

From reader reviews:

Gerard Brand:

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Suzanne Cicero:

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Andrew McConnell:

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