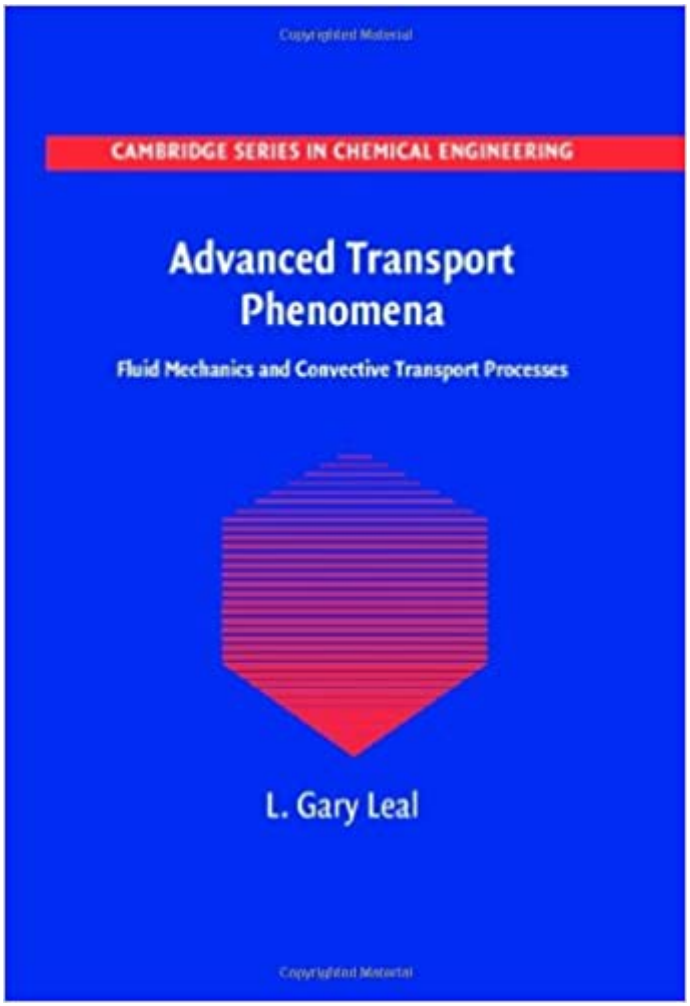
Advanced Transport Phenomena: Fluid Mechanics And Convective Transport Processes (Cambridge Series In Chemical Engineering)



Synopsis

Advanced Transport Phenomena is ideal as a graduate textbook. It contains a detailed discussion of modern analytic methods for the solution of fluid mechanics and heat and mass transfer problems, focusing on approximations based on scaling and asymptotic methods, beginning with the derivation of basic equations and boundary conditions and concluding with linear stability theory. Also covered are unidirectional flows, lubrication and thin-film theory, creeping flows, boundary layer theory, and convective heat and mass transport at high and low Reynolds numbers. The emphasis is on basic physics, scaling and nondimensionalization, and approximations that can be used to obtain solutions that are due either to geometric simplifications, or large or small values of dimensionless parameters. The author emphasizes setting up problems and extracting as much information as possible short of obtaining detailed solutions of differential equations. The book also focuses on the solutions of representative problems. This reflects the book's goal of teaching readers to think about the solution of transport problems.

Book Information

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Customer Reviews

'Advanced Transport Phenomena contains a detailed discussion of modern analytic methods for the solution of fluid mechanics ... With a focus on solving representative problems, the author aims to teach students to think about the solution of transport problems.' The Chemical Engineer'... provides a solid fundamental and detailed description of mathematical and physical principles of fluid

mechanics and mass transfer problems, pointing out the most important practical applications ... extremely well written ... very easily readable ... I believe that the concepts presented in this book will deeply stimulate new research in fluid mechanics and heat and mass transfer.' Ioan Pop, Zentralblatt MATH

Advanced Transport Phenomena is ideal as a graduate textbook. It contains a detailed discussion of modern analytic methods for the solution of fluid mechanics, and heat and mass transfer problems, focusing on approximations based upon scaling and asymptotic methods. The book is also focused on the solutions of representative problems.

I took this class with Professor Leal and the primary complaint was that the writing style was not the standard textbook bullet-point, bite-sized sections style that everyone loves about BSL. BSL is easy as hell to read and it's generally a great book (in my humble opinion). That said, it's written for people who are looking for no more than a functional understanding of fluid mechanics. For a comprehensive, insightful ground-up academic text to deepen your understanding of the nature of fluid mechanics I think people do quite well by Leal's book. It demands to be read slowly but if you have the time and interest you won't be disappointed.

okay

This book is awful. Not only are there numerous mistakes in very important formulas, but it is extremely hard to comprehend. I used it in a graduate level fluid mechanics class and I gained absolutely nothing from it

The book does a perfect job in explaining the equations and concepts in utmost detail and in easy-to-understand narrative style - it is clearly written for the learning student and does not try to address to scholars/experts in the field - so I can recommend it as supplementary reading. Potential buyers beware of the following: As the book subtitle indicates, the book is focused mainly on fluid dynamics covering all advanced fluid mechanics topics, with mass transfer and heat transfer being treated aside, to a much lesser degree. In my opinion, "Advanced Fluid Mechanics" or "Advanced Chemical Engineering Fluid Dynamics" would be much more appropriate title for the book. A welcome feature, the author tries to avoid index notation for third-order, second-order tensors and vectors whenever possible, so most equations are stated in symbolic, coordinate-independent

vector notation, similar to theÂ books by R. Byron Bird. In summary, the book is excellent for graduate students of advanced fluid mechanics as supplementary reading and you should obtain a desk copy (library, ebook, or used) but not necessarily buy it new. By the by, it is true that the text contains a long list of typos (errata, corrigienda), see publisher's website, so a library copy should just well serve the purpose.For a more balanced advanced treatment of the three phenomena in question (momentum transfer, mass transfer, energy transfer), have a close look at the highly recommendable book byÂ John Charles Slattery, also published by Cambridge University Press (Cambridge Series in Chemical Engineering). This reviewer assumes that the reader already possesses a personal copy of Bird's BSL1.

Leal's book has parts that are very well written and in depth, particularly those of Stoke's flow, creeping flow, and parts of dimensional analysis. However, this is mitigated by how disorganized and bombastic the book is. This book does not make a good reference text as the chapters are hard to read in isolation from the other chapters. For exaxmple, several sections on dimensional analysis refer to previous chapters without explicitly saying where the formulas came from. In addition, there is a great deal of redefining variables which is poorly explained and makes the book very hard to follow. A lot of the notation in this book is also counter to a bulk of notation used in the books available on this topic, especially the vector notation (for example, using "^" to represent the cross product as opposed to "X"). As this book is fairly new, there are several mistakes for which there is no errata to go too. Use this book with a bit of caution; it does a great job of working through the math, but it is not the best book on the market. I would recommend the outstanding texts by Bird, Stewart, and Lightfoot and William Deen.

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