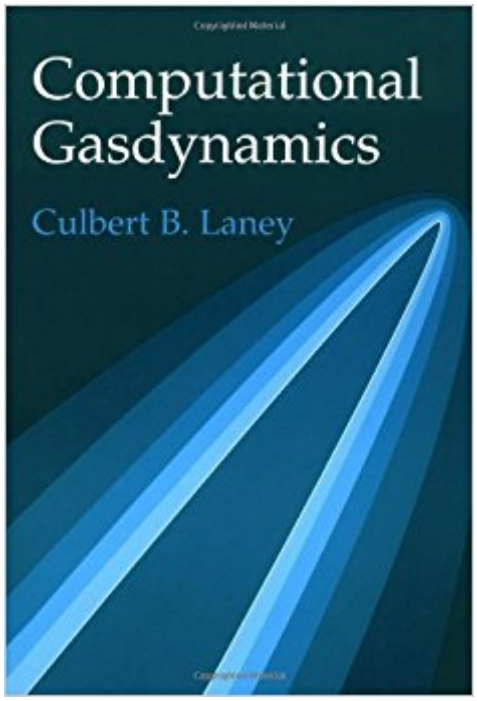
Computational Gasdynamics



Synopsis

Numerical methods are indispensable tools in the analysis of complex fluid flows. This book focuses on computational techniques for high-speed gas flows, especially gas flows containing shocks and other steep gradients. The book decomposes complicated numerical methods into simple modular parts, showing how each part fits and how each method relates to or differs from others. The text begins with a review of gasdynamics and computational techniques. Next come basic principles of computational gasdynamics. The last two parts cover basic techniques and advanced techniques. Senior- and graduate-level students, especially in aerospace engineering, as well as researchers and practicing engineers, will find a wealth of invaluable information on high-speed gas flows in this text.

Book Information

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Customer Reviews

"...the author has succeeded admirably. Highly recommended for personal use and purchase by students and mature practitioners." Applied Mechanics Reviews"...provides a good text bridging advanced shock-capturing methods to numerical basics. The author has painstakingly tried to explain the simple philosophies underlying the complex material...Extensive citations make the book a good reference for students and CFD practitioners alike." The Aeronautical Journal"The book is written in an easy-to-read style: readers can glean as much theory as they wish or can delve directly into how to apply the techniques to real problems. There are plenty of examples. Many techniques are illustrated with application to Burger’s or Euler equations, and the author includes many good homework problems." Choice"This book would make an excellent textbook for a course in

computational fluid dynamics...The book is carefully written and is surprisingly readable...The choice of nomenclature is sensible and mainstream, and Laney has cited the most important papers in the literature. This is a very useful book, and I highly recommend it to anyone working in compressible flow computations." AIAA Journal"...an interdisciplinary reference easily usable by practitioners of different disciplines...this book has the rare virtue of playing two roles well at the same time. On the one hand, it can be appreciated as a valuable textbook for an introductory, as well as for an advanced course on numerical gas dynamics. On the other hand, it can be appreciated as a reference book or a 'user manual' for the practitioners interested in numerically solving engineering or research problems in gas dynamics. I think the author should be congratulated on producing such a useful work, including the comprehensive and well-organized bibliography." Journal of Fluids and Structures

Numerical methods are indispensable tools in the analysis of complex fluid flows. This book focuses on computational techniques for high-speed gas flows, especially gas flows containing shocks and other steep gradients.The book begins with a review of gasdynamics and computational techniques. Next come basic principles of computational gasdynamics. The last two parts cover basic techniques and advanced techniques. Every method is tested on the same carefully constructed set of test problems, which helps to expose similarities and differences under actual performance conditions.

This book is excelente to study high resolution schemes. I suggest it for everybody. Good reading and good work with the suggested algorithms. Good service of the seller transport.

This is a good book but I feel it skimps on the foundation. Compared to other beginner books, as this was supposed to address, was not a beginners book.

This book is a detailed account of the Eulerian numerical methods used for the solution of hyperbolic pde's such as the standard scalar conservation laws of fluid mechanics and gas dynamics. The book directly investigates gas dynamiocs rather than fluid dynamics although it has application there as well through the very successful Godunov method used for multiphase flow and compressible flow leading to shocks.There are several parts: Part I: a lead in to gas dynamics, waves and scalar conservation laws as well as the Riemann problem; followed by Part II: Computational review covering the simplest aspects of numerical methods such as numerical

discretisation and error, interpolation, piecewise functions; Part III: Gas Dynamics itself involving the CFL concdition, upwinding methods, artificial viscosity, linear and non-linear stability; Part IV: Methods of Gas dynamics, for scalar conservation laws and the Euler equations; Part V: advanced methods leading into flux avergaing, flux limited methods, flux corrected methods, hybrid methods and solution averaging.The book deals mainly with numerical techniques for one dimension of space and time although there is a small chapter at the end for multidimensions. In this sense it is deficient, but it must be remembered that 1D methods must be mastered before considering the extension to 2 or 3 dimensions. This is a very detailed book leaving nothing out and explaining the techniques in great detail and in simple language without getting lost. Compare this with the far more difficult approach used by Leveque in his book: "Finite Difference Methods for Differential Equations". If you wish to deeply understand the area then this is your text with over 600 pages making up the book its worth every cent although the rather high price of around US$60 is too high for most students. If you can afford it buy it, there is no better book for both an introduction and detail, most of the material is covered elsewhere in class notes and research papers but the fact it is explained in a single book with good continuity is a godsend.

I have to admit that I was at first disappointed to see that the book was loaded with description of schemes in 1-D, with scant space dedicated to multi-dimensional problems. However, I must say that the coverage is easily the most clear and complete of the books on this subject. Other texts may be required to flesh out the schemes and boundary conditions in multi-dimensional space, but a reader will be well served with the good fundamental base that this text provides.

Has a good style: * Gives clear decription of physics * Gives a good introduction to basic numerics * Clearly explains various techniques developed over the last few decades, and the incentive behind their development * Up to date, with many modern schemes

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