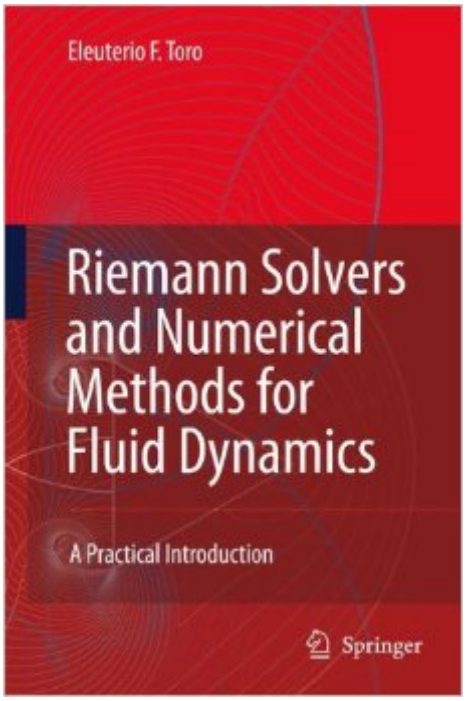
Riemann Solvers And Numerical Methods For Fluid Dynamics: A Practical Introduction



Synopsis

High resolution upwind and centered methods are a mature generation of computational techniques. They are applicable to a wide range of engineering and scientific disciplines, Computational Fluid Dynamics (CFD) being the most prominent up to now. This textbook gives a comprehensive, coherent and practical presentation of this class of techniques. For its third edition the book has been thoroughly revised to contain new material.

Book Information

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Customer Reviews

Have to agree with Mark, this book is quite superb. Professor Toro does a superb job - it took me from knowing nothing about shock capture to being able to write my own high resolution code in about six months. Coupled with the Numerica software it is an invaluable tool for learning about compressible flow.

By far the best computational fluid dynamics text I have come across during my thesis research! The author presents modern shock-capturing numerical methods for solving the time-dependent hyperbolic conservation laws in multiple dimensions with exceptional clarity. Most of the text focuses on Godunov methods and is littered with practical applications and discussions for those with a limited background in CFD. In addition, Toro presents a simpler interpretation of his WAF method. In terms of readability, I found this book to be far superior. It will undoubtedly become as indispensible in the CFD field as those by Fletcher, Hirsch and LeVeque!

This is the book you want if you need to solve real compressible flow problems. It covers all the basics plus there's tons of advanced materials. I especially like the fact that there are numerous detailed examples and coding templates. In addition, the book contains a very extensive reference, allowing the reader to go back to the orginal papers.

I am not aware of too many texts directed specifically at the finite volume and Riemann solver approaches, and so finding any book discussing details of these methods is hard to come by, and finding a very good one is just rare. But this book presents an excellent review of these kinds of numerical schemes for hyperbolic problems. I used this text (both the first and third edition) extensively throughout graduate school. I kept the library copies well beyond what I was allowed to. I will always keep it within my arm's reach. It is an advanced text; I had to start with LeVeque's book (Finite Volume Methods for Hyperbolic Problems (Cambridge Texts in Applied Mathematics)) to understand a lot of the basic concepts (LeVeque's book is also an excellent text on these topics). The approaches and discussions in Toro's text are formulated in a very mathematically rigorous language, which can be daunting to read, but I found that this language helped significantly in my transition from knowing basic concepts to specifying the details precisely in a rigorous fashion. I have not experimented at all with the Numerica libraries that the book discusses, but I found most parts of the text readable enough to write my own code from.

Many important references are not included. The description of the HLLE scheme in the book is incomplete and partially wrong. The reader is referred to the original paper.

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