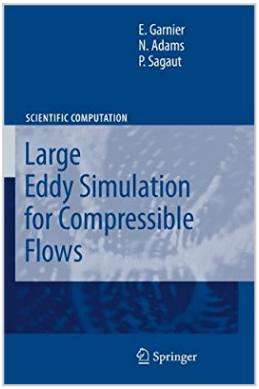

Large Eddy Simulation for Compressible Flows (Scientific Computation)

By Eric Garnier, Nikolaus Adams, P. Sagaut

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This book addresses both the fundamentals and the practical industrial applications of Large Eddy Simulation (LES) in order to bridge the gap between LES research and the growing need to use it in engineering modeling.

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- Sales Rank: #3378628 in Books
- Brand: Brand: Springer
- Published on: 2009-08-17
- Original language: English
- Number of items: 1
- Dimensions: 9.21" h x .69" w x 6.14" l, 1.28 pounds
- Binding: Hardcover
- 276 pages

Editorial Review

From the Back Cover

Large Eddy Simulation (LES) of compressible flows is still a widely unexplored area of research. The authors, whose books are considered the most relevant monographs in this field, provide the reader with a comprehensive state-of-the-art presentation of the available LES theory and application. This book is a sequel to "Large Eddy Simulation for Incompressible Flows", as most of the research on LES for compressible flows is based on variable density extensions of models, methods and paradigms that were developed within the incompressible flow framework. The book addresses both the fundamentals and the practical industrial applications of LES in order to point out gaps in the theoretical framework as well as to bridge the gap between LES research and the growing need to use it in engineering modeling.

After introducing the fundamentals on compressible turbulence and the LES governing equations, the mathematical framework for the filtering paradigm of LES for compressible flow equations is established. Instead of providing the reader with a general discussion about compressibility effects on turbulence, the emphasis is put on differences in scale interactions compared to the incompressible case. Functional modeling is discussed, including a brief introduction into implicit modeling from the functional perspective. The description of explicit structural modeling contains different models based on the scale-similarity hypothesis, on approximate deconvolution, and on multi-resolution concepts to reconstruct the subgrid-scale field. A central part of the monograph is the discussion of numerical methods in relation to LES. After evaluating boundary conditions for LES of compressible flows, which are much more complex than its counterpart for incompressible flows, the last chapters are dedicated to specific applications to sub- and supersonic flows, including a discussion of shock-related problems.

About the Author

Pierre Saugaut is one of the leading scientists in scientific computing (Simulation, Analysis and Modeling of Compressible Turbulent Flows), and his books are considered the most important in the field of LES theory and applications (he has been given the ONERA award for the best scientific publication in 1997,1999, 2001). He is teaching at the Pierre et Marie Curie Universite Paris.

The author has published several books with Springer ("Large Eddy Simulation for Incompressible Flows", ISBN 978-3-540-26344-9; "Introduction a la simulation des grandes échelles pour les écoulements de fluide incompressible", ISBN 978-3-540-64684-6; "Turbulence and Interactions", ISBN 978-3-642-00261-8; "Quality and Reliability of Large-Eddy Simulations", ISBN 978-1-4020-8577-2). He is in the Editorial/Advisory Board of the Springer Journals "Theoretical and Computational Fluid Dynamics" and "Journal of Scientific Computing".

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