



Unsteady Computational Fluid Dynamics in Aeronautics: 104 (Fluid Mechanics and Its Applications)

By P.G. Tucker



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The field of Large Eddy Simulation (LES) and hybrids is a vibrant research area. This book runs through all the potential unsteady modelling fidelity ranges, from low-order to LES. The latter is probably the highest fidelity for practical aerospace systems modelling. Cutting edge new frontiers are defined.

One example of a pressing environmental concern is noise. For the accurate prediction of this, unsteady modelling is needed. Hence computational aeroacoustics is explored. It is also emerging that there is a critical need for coupled simulations. Hence, this area is also considered and the tensions of utilizing such simulations with the already expensive LES.

This work has relevance to the general field of CFD and LES and to a wide variety of non-aerospace aerodynamic systems (e.g. cars, submarines, ships, electronics, buildings). Topics treated include unsteady flow techniques; LES and hybrids; general numerical methods; computational aeroacoustics; computational aeroelasticity; coupled simulations and turbulence and its modelling (LES, RANS, transition, VLES, URANS). The volume concludes by pointing forward to future horizons and in particular the industrial use of LES. The writing style is accessible and useful to both academics and industrial practitioners.

From the reviews:

"Tucker's volume provides a very welcome, concise discussion of current capabilities for simulating and modelling unsteady aerodynamic flows. It covers the various pos

sible numerical techniques in good, clear detail and presents a very wide range of practical applications; beautifully illustrated in many cases. This book thus provides a valuable text for practicing engineers, a rich source of background information for students and those new to this area of Research & Development, and an excellent state-of-the-art review for others. A great achievement."

Mark Savill FHEA, FRAeS, C.Eng, Professor of Computational Aerodynamics Design & Head of Power & Propulsion Sciences, Department of Power & Propulsion, School of Engineering, Cranfield University, Bedfordshire, U.K.

"This is a very useful book with a wide coverage of many aspects in unsteady aerodynamics method development and applications for internal and external flows."

L. He, Rolls-Royce/RAEng Chair of Computational Aerothermal Engineering, Oxford University, U.K.

"This comprehensive book ranges from classical concepts in both numerical methods and turbulence modelling approaches for the beginner to latest state-of-the-art for the advanced practitioner and constitutes an extremely valuable contribution to the specific Computational Fluid Dynamics literature in Aeronautics. Student and expert alike will benefit greatly by reading it from cover to cover."

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Editorial Review

Review

“This book is an excellent read; it is probably the most technically detailed book I have read in computational aerodynamics ... and also the most interesting and enjoyable to read. ... The book would make essential reading as a thorough historical review of and introduction to high-fidelity CFD for graduate students, and an enjoyable and interesting read for experienced academics and practitioners in state-of-the-art computational aerodynamics. The author should be congratulated on his efforts.” (C. B. Allen, The Aeronautical Journal, 2014)

From the Back Cover

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