overview of major concepts and fundamental principles and an excellent starting point for further studies.

The next section of the book is focused on the aerodynamic design process starting with geometry parameterisation. The major steps involved in solving computational fluid dynamic problems are discussed. It also presents low-fidelity aerodynamics models that lead to the construction of physics-based surrogate models. The following major section presents examples of the shape optimisation applied to a transonic as well as subsonic aerofoil and wing.

The text is concise, clearly written and systematically organised. It contains the equations and formulae needed to solve practical problems. The text is amply illustrated. The supportive drawings facilitate understanding of the theory and are of good quality. The book also successfully presents selected applications of surrogate-based optimisation in other areas, such as the design optimisation of microwave filters. These were very carefully selected to demonstrate major challenges related to the performance of the optimisation algorithm. The practical implementation of some optimisation concepts is supported by MATLAB examples, which are included at the end of the book.

The book is well presented and should appeal to a wider audience interested in computational optimisation design. It explains the major concepts, gives enough depth and provides references for further studies.

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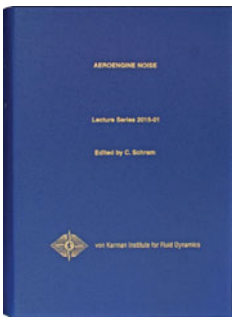

Aeroengine Noise

Edited by C. Schram

Von Karman Institute for Fluid Dynamics, Rhode Saint Genese (https:// store.vki.ac.be/ aeroengine-noise-ls201501.html). 2015. Irregular pagination. Illustrated. €270.

Although modern aircraft are much quieter than their predecessors, the growth in the size of the airliner fleet and number of movements over the last few decades has ensured that noise continues to be a social and political issue. As a consequence, the noise constraints on modern aircraft continue to tighten and noise assessment and reduction remain an important part of the process of designing new aeroengines.

This set of proceedings follows the usual format of the Von Karman Institute (VKI) Lecture Series, with several international experts in the field having been invited to present an introduction or overview of a particular topic. When taken together, the series of lectures are intended to form an introduction for engineers and scientists entering the field.

The initial two lectures in this volume are presented by representatives of industry

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and are used to set the scene for the more technical topics that follow. The first, presented by Nicolas Tantot of Snecma, looks at the factors that control aeroengine efficiency and how this is driving engine architectures towards ultra-high bypass ratios and open rotors. This is followed by a discussion of engine-airframe aeroacoustic integration and installation effects by Thomas Nodé-Langlois of Airbus. He starts by looking at the noise certification process before moving on to consider how other design decisions, from inlet geometry to the way the engine is mounted on the aircraft, may have an impact on noise.

Christophe Schram of VKI then kicks off the more technical presentations with an introduction to acoustics and flow noise. He begins from first principles in deriving the wave equation, moves rapidly on to consider the various acoustic analogies on which most analytical methods are based, and finally considers numerical acoustics in the form of finite and boundary element methods. Although he covers a lot of ground, the information is well presented and remains pleasingly readable.

The following three lectures are all given by Michel Roger from Ecole Centrale de Lyon and consider analytical methods for turbomachinery noise prediction. Firstly, we are introduced to the noise of open rotors, covering isolated rotors, rotor-wake interactions and then counter-rotating propellers, the emphasis being on the treatment of rotating sources rather than prediction of source levels. In Roger's second lecture, he introduces the effect of a hard-walled annular duct on the generation and propagation of sound. In his third lecture, he takes us through the modelling of various blade and vane aerodynamic sound sources.

Combustion noise and thermoacoustics are covered in a lecture by Maria Heckl from Keele University, with the emphasis clearly on thermoacoustic instabilities. She begins by using the Rijke tube to introduce fluctuating heat release as a source of sound, before moving on to instabilities in combustion systems.

The next lecture, on aeroengine nacelle liner design and optimisation, is presented by Gwenael Gabard from the ISVR at the University of Southampton. He begins by considering sound absorption by perforated liners, then how this is related attenuation of sound propagating in a duct, and finally how liners are optimised for a given sound source and duct geometry.

Jet noise, both subsonic and supersonic, is addressed by Messrs Bailly, Bogey, Marsden and Castellain from the LMFA in Lyon. They begin with a discussion of the sources and scaling laws, before moving on to discuss control of subsonic jet noise and supersonic jet noise mechanisms in more depth.

Mario Felli of the Italian National Maritime Technology Research Institute then presents a lecture on experimental methods applied to jet noise, starting with purely acoustic methods for source location before moving on to more interesting techniques which attempt to relate aerodynamic events with noise production.

In the final lecture of the series, Roberto Camussi of Università Roma Tre discusses advanced analysis techniques for identification of noise sources in turbulent flows. He introduces wavelet transforms, Linear Stochastic Estimation and Proper Orthagonal Decomposition, and then considers the ap-

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plication of these to some typical aeroacoustic problems, including jet noise, turbulent boundary layers and fan-tip leakage.

These proceedings are all well written, clearly presented and easy to follow. The presenters are all active researchers and engineers, and, consequently, the information is topical and current. The long lists of references and bibliographies provide an excellent starting point for further study. The preface to the volume claims, rather boldly, that all sound production mechanisms are addressed. This is not the case, as some aeroengine noise sources, such as engine handling bleed valves and broad-band combustion noise, are missing. But these are minor omissions, and it is fair to say that all the major sources are covered. This lecture series would indeed constitute an excellent introduction for engineers, scientists and PhD students entering the field.

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Aero Acoustics

Aircraft Control and Simulation: Dynamics, Controls Design, and Autonomous Systems – Third edition

B. L. Stevens *et al*

John Wiley and Sons, The Atrium, Southern Gate, Chichester, West Sussex, UK, PO19 8SQ. 2016. 749pp. Illustrated. £110. ISBN 978-1-118-87098-3.

When the first edition of this book appeared in 1992, it filled a major hole that existed in texts available on current flight dynamics practice. The application of control theory in the 1950s and 1960s was supported by books such as those by Etkin (*Dynamics of Flight Stability and Control*) and McRuer (*Analysis of Nonlinear Control Systems*) et al, but by the 1990s, major advances had been made in control theory, computing and simulation and the book by Stevens and Lewis reflected these changes. In subsequent years, many other books have addressed the same area so that flight dynamics is now well served with textbooks. This third edition updates the original material and adds two new chapters on unmanned air vehicles.

The book retains its original chapter subject skeleton with the titles slightly changed and as mentioned has two new chapters added – in total it is some 150 pages longer than the original. This is not, however, a simple graft of new material onto the original book. Many of the chapters have been rewritten so that even where much the same material is covered, it is more detailed and augmented, whilst at the same time maintaining a consistent uniform style across the whole book. As before, each chapter has

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