analysis. Methods are deliberately chosen to be appropriate for the level of precision practical in the conceptual phase. For instance, at the start of the chapter on wing-body aerodynamics, it is pointed out that in industry today the design would be handed over for CFD analysis. Here, in the spirit of the text, they provide the reader with well-respected methods selected from the publications of the (US) Air Force Flight Dynamics Laboratory, NACA and NASA. Again, in a cost estimating example the authors advise that a value within 22% is considered quite close.

Examples of some of the more unusual topics included in the book are methods of evaluating aerodynamic heating of the airframe above M2.0, the new chapter on stealth, sections on powered high-lift devices for V/STOL, the design and sizing of supersonic engine intakes and an introduction to the graphics (carpet plots and knotholes) used in displaying the results of trade studies.

The authors' style is brief, succinct and to the point which results in a very rich text. The publication is excellent. Presentation, using half tones, is clear and easy to follow. Drawings and charts are clear. A block of 24 colour plates is included at the back of the book. There is also an ample scattering of side notes and comments which adds to the pleasure of browsing. The few shortcomings are small and trivial in comparison with the wealth of useful material presented.

I can't recommend this book strongly enough. It is well-written and rich with information. Although the authors have aimed it at 'upper-level undergraduate and graduate students as well as at practicing engineers', I feel that many will find it gives valuable insights into the designs of the full range of fixed-wing aircraft and shows why they are the shapes they are. This is a book to be enjoyed and returned to. It should prove a valuable reference source.

Footnote regarding Volume 2. This is not yet in print; the authors anticipate publication in Spring 2012. The text will concentrate on lighter-than-air craft. The significance of this may be apparent from a quick reflection on recent Lockheed Martin activity in this area, both on hybrid airships for heavy-lift and the ISIS programme to put surveillance airships into the stratosphere. What will be of special interest to readers of this review is that the volume will also contain a number of case studies of fixed wing aircraft including; Boeing 777, F-35B Joint Strike Fighter, T46A primary jet trainer, SR-71 Blackbird, Cessna 172 Skyhawk and the Daedalus human-powered aircraft that flew across the Sea of Crete.

John M. Robertson CEng, MIMechE, MRAeS.

What Every Engineer Should Know About Computational Techniques of Finite Element Analysis – Second edition

L. Komzsik

CRC Press, Taylor and Francis Group, 2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN. UK, 2009. 331pp. Illustrated. £54.99. ISBN 978-1-4398-0294-6.

This book is an authoritative and valuable addition to the literature on the subject. It offers an insider's view of the mathematical formulation underpinning NASTRAN, still regarded by many as the leading finite element code worldwide. I cannot determine whether the initial line of the title 'What every engineer should know about…' is written in hope or is simply 'tongue in cheek'. In that respect it may be regarded as probable as 'What every driver should know about the thermal cycles of the internal combustion engine' – much as one may like it to be otherwise, it just isn't going to happen.

That said, the book offers a clear development of the mathematics underpinning the coding of a finite element system. Whilst mathematical sophistication, such as the use of Banach or Hilbert spaces is avoided, the reader will still need to be comfortable reading through matrix algebra on virtually every page.

Part 1 of the book on Numerical Model Generation is unexceptional. It briefly mentions Ritz and variational methods before homing in on Galerkin's method that dominates the derivation of finite elements. Unusually in an FE book, the author also introduces CAD geometric concepts from Bezier splines to NURBS objects before moving to topics such as Delaunay tessellation. Many of the theoretical developments are supported by, or even made in the context of, simple examples.

For me, much of the interest of the book lies in Part 2 - Computational Reduction Techniques. Here one gets to look 'under the bonnet' and gain understanding of how sparse matrix techniques as multi-frontal factorization work and produce benefit in terms of computational efficiency. There are also chapters describing spectral computations and dynamic reduction.

The story is completed in Part 3 of the book with derivation and description of some of the more arcane solution sequences and the representation of the computed results.

Whether one regards the book as a fascinating read or a reference book of last resort will depend on the mathematical upbringing of the reader, though in either case the book earns its space on the shelf.

Peter Bartholomew MSc, DPhil,

Rocket and Spacecraft Propulsion: Principles, Practice and New Developments – Third edition

M. J. L. Turner

Springer-Verlag, Tiergartenstrasse 17, D-69121 Heidelberg, Germany. 2009. 414pp. Illustrated. £89.99, ISBN 978-3-540-69202-7.

Rocket Propulsion Elements – Eighth edition

G. P. Sutton and O. Biblarz

John Wiley and Sons, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK, 2010. 768pp. Illustrated. £90. ISBN 978-0-470-08024-5.

Introduction to Rocket Science and Engineering

T. S. Taylor

CRC Press, 2 Park Square, Milton Park; Abingdon, Oxon, OX14 4RN, UK. 2009.

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