this time, many textbooks on composite materials have emerged, helping to educate several generations of aircraft designers and aeronautical engineers. Some of these books stood the test of time and are now entering into their third editions. *Composite Materials for Aircraft Structures* is one of these few. Its first edition was published in 1986, second in 2004 and the third in 2016.

Two things make this book remarkable. Firstly, the book is focused on aircraft structures and everything an engineer needs to know about composites and all that they are made of, from fibre and matrix properties, manufacturing, quality control and fundamentals of mechanics of composite materials to joining, damage detection and repair. Secondly, unlike other textbooks, this one is written not by a single author or a pair of co-authors, but by a large team of contributors from many universities and research institutions, predominantly from Australia, but also from Malaysia and USA. It is to the editors' great credit that the book does not feel like a patchwork of separate chapters but a volume that speaks with one voice and reflects a shared vision underpinned by vast theoretical knowledge and practical expertise of the team.

The book is generously illustrated with figures, photographs, diagrams and tables that support discussion and aid understanding of various points in the text. It is great as a reference work, but for a textbook to be used in teaching of university students, it does not have many examples or problems to solve. Although one could argue that they are not really necessary in a volume that is already 600 pages long, since students could be referred to other excellent textbooks around for suitable exercises.

Another thing is missing from the book – a chapter on recycling. With composite structures being used so extensively nowadays, a question of what happens to them after they reach the end of their service life should be considered and discussed. Something for the fourth edition, perhaps?

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Practical Methods for Aircraft and Rotorcraft Flight Control Design: An Optimization-Based Approach

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The field of aircraft control systems design is one that faces thought-provoking challenges at its core. The ultimate purpose is far beyond merely stabilising aircraft – the complicated and fickle field of handling qualities (how the handling behaviour of an aircraft is perceived by humans flying in them, particularly those piloting them) must somehow meet and cooperate with the rich and rigorously technical elements of control theory.

First and foremost, this book does well to impart on the reader a sense of this challenge. Dismantling the title and assessing the book against the constituent pieces, we are to expect both fixed-wing and rotary-wing configurations to be covered, the overall strategy of the book to be of practical use and optimisation to be the tool used in doing so. The book does deliver on each of these counts. Concepts explained are given background in both fixed and rotary wing contexts. Regarding practicality: a comprehensive guide to the implementation of these concepts is provided through recourse to the CONDUIT tool in MATLAB, and real-world case studies are supplied for examination. The benefits of using multi-objective parametric optimisation for the design of aircraft control systems is well explained, as well as decent coverage of the theory behind the available optimisation algorithms themselves.

Following the quantitative-qualitative schism through to the completion of the design process, the book is particularly insightful in its explanation that ultimately all optimised design points are compromises between the conflicting requirements and are therefore a function of how those requirements have been prioritised, which itself is a matter concerned with what exactly the control system is being designed for.

Chapters 1–3 introduce the reader to the flight control system design field as a whole, multi-objective parametric design and the CONDUIT software. Chapters 4–6 cover case studies and the rigorously qualitative aspects of control system design, in terms of the requirements that are to be satisfied through the optimisation. Chapters 7–9 cover the actual design of control systems, including sensitivity and robustness assessment of the design point selected by the optimisation. Chapters 10–13 cover more advanced concepts beyond the completion of the optimisation, such as flight-test evaluation of control laws and alternative design methods.

The reader may be left wanting for more thorough exploration of the helicopter case study, which rather lies in the shadow of the XV-15 tiltrotor one that is given, or perhaps a more even balance of fixed-rotary wing case studies. Additionally, the large number of authors contributing to the book has lent it a slightly piecewise feel; for instance, the same XV-15 top level block diagram appears several times throughout the work, introduced each time as if it were the first. These are, however, minor blemishes, and on the whole, the work is well-considered, polished and suitable for both students and engineers in industry.

Chris Mair

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