they are hidden within complicated expressions thus the presentation necessitates from the readers to be already familiar with and have mastered the vector/tensor calculus as well as the basic differential calculus.

Throughout the text, discussion evolves mainly, but not solely, around homogenous material in an effort to focus more on the widely used metallic materials for airframe structures. The concepts of laminated composites – and the analysis of – are briefly touched upon which may have an adverse effect on the reader since a more extensive reference is required to properly comprehend the mechanics of composite materials. Similar to previously mentioned, energy methods and the application of to a discretised continuum giving rise to the finite element method is also briefly discussed and the readers are expected to be aware of the underlining concepts of the method. The last chapters present a number of very interesting and educative examples along with their solutions which put the previously outlined theory into context.

Overall, this textbook provides aerospace engineering undergraduates with a mathematical description on the fundamentals of the mechanics of materials. Apart from the fundamentals, the content is lean and on some occasions not to the expected level for understanding. The audience has to have some prior knowledge in few key elements and knowledge domain areas.

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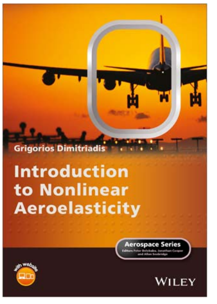

Introduction to Nonlinear Aeroelasticity

G. Dimitriadis

John Wiley and Sons, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK. 2017. xiii; 573pp. Illustrated. £81.95. ISBN 978-1-118-61347-4.

Despite aeroelasticity being taught in most aerospace engineering programmes, and an essential discipline in aircraft design offices, there are very few books that cover the subject. An unintended consequence of that is often the research in the area has moved in circles, as many ideas that do not get disseminated in bounded printed form reappear periodically (often with a frustratingly low period!).

It is in this context that the new book by Prof Dimitriadis is a very welcome addition to the aeroelastic corpus. As the title says, it is an introductory level book to the many problems in aeroelasticity that cannot be described by linear theories. It is also an introduction to nonlinear dynamics for aeroelasticians, or, more generally, for aerospace engineers.

The scope is vast, ranging from numerical methods for the analysis of nonlinear systems to the details of the semi-empirical models of dynamic stall, with its unifying theme being the numerical computation and the analysis methods for an array of canonical problems. Even though some summaries are included as appendices, the book expects the readers to be already familiar with linear aeroelastic theories, but this is possibly a fair assumption to make and that material is already well-covered elsewhere. Tackling nonlinearity also implies choices of methods and problems, and Prof Dimitriadis has managed a balanced book that covers the most common approaches in the aeroelasticity literature (bifurcation analysis, harmonic balance, numerical continuation, Lyapunov stability), as well as the most relevant physical problems (stall flutter, galloping, free play, high-aspect ratio wings).

The book is full of numerical examples prepared by the author, and the MATLAB® source code is made available to the readers through a website (oddly, they are offered as a teaching aid and the registration requires information of classroom size, which may put off some readers). This is very suitable for the material and I highly recommend going through the examples in the book next to a computer. Once the basic theories are assimilated, a good understanding of the dynamics of nonlinear systems requires active exploration, which can rarely be done analytically. Showing only results computed by the author gives the book a unified, self-contained feeling and it is consistent with how introductions to nonlinear dynamics are often written in the mathematical sciences, but it may also be its major limitation: experimental results rarely appear to illustrate the basic physics and/or justify the modelling choices (I found them only for the validation of the nonlinear aerodynamic models in Chapter 8) and, while the booked is peppered with sketches, it is also missing a few photographs of realisations or experimental observations from the physical world.

Overall, this book will be a great aid to practising aeroelasticians that can no longer hide nonlinear effects into their conservative factors, to researchers that seek a good reference for the most common basic theories in nonlinear aeroelasticity, as support reading to postgraduate-level courses in nonlinear dynamics (where nonlinear aeroelastic systems are already often used as examples from engineering) and, this reviewer also hopes, to encourage the formal teaching of Nonlinear Aeroelasticity at the postgraduate level.

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