Book Reviews

Sport Aerodynamics

Edited by H. Norstrud

Springer-Verlag, Tiergartenstrasse 17, D-69121 Heidelberg, Germany. 2008. 331pp. Illustrated. £134. ISBN 978-3-211-89296-1.

The title of this book suggest to the reader that it is a work on the aerodynamics of sport. It is actually both more and less than this; not all sports are covered and more is contained than just aerodynamics.

The book, edited by Helge Nørstrud, is a compilation of lecture notes and a selection of papers by authors who clearly know a thing or two about their respective areas. Sadly, the diagrams are generally of poor quality and there are quite a few grammatical errors in the early chapters that irritate the reader.

Seven of the twelve 'papers', representing around 42% of content, cover winter sports such as downhill skiing, ice skating and ski-jumping. Although four chapters on ski-jumping is perhaps excessive, the topics follow the approach in science towards aerodynamics in sport i.e. a look at the historical trends in performance; the human factors that effect performance such as body mass and take-off velocity; flight simulation using analytical models; and flow visualisation using wind tunnels and computational fluid dynamics.

A single review paper on ball sports by Rabi Mehta makes up around 32% of pages and covers more or less what is expected – cricket, golf, tennis, football, baseball and volleyball. If the intricacies of boundary flow around rotating seamed or dimpled spheres are your thing (I admit it is) then this review is a good place to start (as is the original 1985 version by the author). There is nothing really new here as the data is all published elsewhere but it is always nice to see aerodynamics papers on ball sports summarised in one place with a reference list to match.

The other sports included in the book are track running and cycling with much of the work dominated by physiology rather than aerodynamics. Important sports are omitted – sailing, javelin, bobsleigh for instance – that would have bridged the gap between winter sports and ball sports.

So, would I buy the book? At £134 probably not. But I would try and persuade my University library to get it on the principle that there is enough in there for the occasional consultation.

Professor Steve Haake, Director, Centre for Sports Engineering Research, Sheffield Hallam University

The Simple Science of Flight: From Insects to Jumbo Jets – Revised and Expanded edition

H. Tennekes

The MIT Press, Fitzroy House, 11 Chenies Street, London, WC1E 7EY, UK. 2009. 201pp. Illustrated. £16.95. ISBN 978-0-262-51313-5.

This book was well received in its original form, and the author has now taken the opportunity to further refine and expand it. It is principally concerned with the flight mechanics and performance of almost anything that flies, from insects and birds to large airliners. As his analytical tools, he uses very simple expressions based on elementary mechanics and school-level physics. The advantage of this approach is that fundamental issues are not lost in a cloud of detail and the results are good enough for his intended illustrative purposes. A great deal of time and money could have been saved in the past if overenthusiastic pioneers had first sat down to make a proper fundamental assessment of their pet projects by adopting the author's line of approach.

An unusual aspect for such a technical book is that it is presented primarily in continuous prose form, with the frequently occurring calculation steps being embodied in the text. It is therefore probably best read in small digestible bite-sized chunks.

The first few chapters are mainly concerned with bird and insect flight where the author has drawn on a large amount of research data, some of it quite recently obtained. He uses his analysis techniques to show how the shapes, physical properties and flight characteristics of a wide range of creatures match their special evolutionary niches. The piece de resistance is possibly his explanation and description of how the bar-tailed godwits manage to fly non-stop across the Pacific from Alaska to New Zealand with no in-flight catering.

In the chapter on 'Flying Playthings' there is an interesting section on man-powered flight, a subject that has received remarkably scant attention in all but specialist publications. In the last chapter he looks at airliners, showing that like birds, their physical properties have evolved to produce a near optimum fit to their particular niche market. His somewhat dismissive comments on Concorde are perhaps a little unfair in view of its 27 years of rapid transatlantic premium service, but aeronautical enthusiasts will always find things to argue about.

This is a fascinating book that appears to solve many of the mysteries surrounding bird and insect flight, and for aspiring aeronautical engineers, a text that is well worth reading before one gets too lost in the labyrinths of detailed analysis.

Dr R.H. Barnard, CEng, FRAeS

Computational Dynamics – Third edition.

A. A. Shabana

John Wiley and Sons, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK. 2010. 528pp. Illustrated. £95. ISBN 978-0-470-68615-7.

This book extensively covers the many ways of generating the equations required for computing the dynamics of multi-body systems, including Lagrangian, Hamiltonian and Gibbs-Appel formulations. The first six chapters are devoted mainly to planar motion of systems, the next covers spatial dynamics. Following these is a chapter which discusses some special topics such as Quaternions. The final chapter is devoted to computer codes but only comments on SAMS/2000 – there is no direct link with previous chapters. However, more information on SAMS/2000 can be downloaded from the Wiley site.

I have no reason to doubt the mathematical content of the book but there are a few misinterpretations of basic dynamics which make one a little apprehensive. What the author calls D'Alembert's Principle is used to generate what he refers to as the Newton-Euler Equations, however both are simply rewrites of Newton's Equations. Later the principle of virtual work is used to lead to equations which are directly obtainable from the true D'Alembert's Principle. There are quite a few cases where development seems to be unnecessarily extended.

Another minor point is the use of the same symbol to express a vector or a column matrix, the results come out correct in the end. The use of the word 'moment' can be misread as it usually relates to the moment of force but the axis is not always initially clear. At times it refers to a couple, but this word is not used.

The book is over 500 pages long but of which 40 pages relate to just one computer code. Nevertheless this book will be of great help to those searching for different ways of expressing the relevant equations of motion for use with computer applications.

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