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REVIEW

Aerodynamics. By L. J. CLANCY. Pitman, 1975. 610 pp. £10.00.

The scope of this book is wide and includes the mechanics of flight and aircraft performance in addition to the usual topics of basic fluid mechanics, aerofoil and wing theory, boundary layer theory, gas dynamics and experimental techniques. In some 600 pages such breadth implies that no more than an elementary treatment can be expected and the author's stated aim has been to produce a book for students preparing for a first degree in aeronautical engineering. The author has taught aerodynamics for many years at the Royal Air Force College, Cranwell, where he has given courses ranging from a basic non-mathematical course in aerodynamics suitable for pilots, to a course leading to a CNAA degree in aeronautical engineering for Engineering cadets, and this book is based on his experience.

There is an undoubted need for a relatively cheap but good book of this broad scope and purpose; the purchase of available specialized books on the individual subjects covered tends to put too heavy a financial burden on the pocket of the average student. The few similar books that have been written in the past are in large measure out of date if not out of print. The reviewer therefore approached this book with the lively hope that here was a book that he could warmly recommend to his students; but in the event he found it disappointing.

A key test of such a book is how it deals with fundamental concepts; one does not expect the subtleties of more specialized treatises, but one expects clear explanations which are not misleading and on the basis of which the student can confidently be expected to develop his grasp of the subject. What, however, can a student make of this definition of pressure (p. 1): "The term pressure is used here to relate to the force per unit area exerted by the air on an immersed body by virtue of its static presence and not by virtue of any relative motion which may exist", soon to be followed by Bernouilli's theorem and illustrations of pressure distributions on aerofoils? Bernouilli's theorem for incompressible flow is presented (p. 19) as resulting from the conservation-of-energy principle but no explanation is offered as to why thermal contributions can be ignored in this case, although later (p. 240) when the energy equation in adiabatic flow is discussed these are rightly included. On page 42 it is stated that unless the trailing edge of an aerofoil is cusped the flow cannot leave both upper and lower surfaces smoothly and in consequence a wake develops resulting in a circulation less than that predicted by the Kutta condition and a rear stagnation point on the upper surface is then present just forward of the trailing edge. Yet this is followed by a brief but essentially correct description of the formation of the boundary layers on the wing surfaces and their merging at the rear to become the wake. On page 46 the reader is told that the effects of surface roughness, waviness and free-stream turbulence on transition are generally marginal. The discussion on pages 76 and 77 on downwash behind a lifting wing is confusing

as it tends to leave the student with the idea that there is no downwash behind a two-dimensional wing. The discussion on flaps (ch. 6, pp. 100 *et seq.*) contains some very dubious remarks on the relative merits of split and plain flaps, and the importance of good slot design for slotted flaps is not mentioned. On page 247 it is stated that in supersonic flow compression cannot occur gradually but only suddenly through a shock wave, and the discussion on high-speed subsonic aerofoil sections (ch. 11, pp. 277 *et seq.*) shows that the author is unaware of the more important developments in recent years. There are several dubious statements related to the effects of sweep, aspect ratio, and the interaction of leading-edge vortices and boundary layers in the following sections of this chapter.

The treatment of aircraft stability and control (ch. 16, pp. 474 *et seq.*) also has its quota of misleading over-simplifications. Tail lift is ignored compared with wing lift in discussing static margins and there is a curious use of the term lateral stability (p. 525) to denote only stability in roll, although when discussing dynamic stability of the lateral motion (p. 543) there is no reference to the rolling mode but instead a simple directional divergence is introduced as a possible form of instability.

Other examples of confusing or misleading statements can be culled from the book but these will suffice to illustrate why it cannot be recommended. There are no exercises and no references and the illustrations are generally crude. It seems that the author has too hastily put together his lecture notes from different courses and hoped that the result would be a satisfactory textbook. In the event the frequently crude simplifications of the non-mathematical lectures for pilots do not merge satisfactorily with the content of the undergraduate course.

Mr Clancy might well have had the material for a useful textbook, but he appears to have lacked the time and the expert guidance to have made a sound job of preparing it.

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