which are well-known in one branch of science or engineering may be quite unknown to workers in other branches.

The subject generally is one which those who wish to be abreast with modern thought cannot neglect, and the book is admirably adopted to act as a preliminary textbook.

Air Licences

By T. Stanhope Sprigg. Sir Isaac Pitman and Sons, Ltd. Price 3/6.

As there are no less than 21 licences and certificates connected with civil aviation, and as most of those who earn their living or derive recreation from this form of transport have to be in possession of one or more of these documents, there is certainly scope for a book which explains how they may be obtained, especially as the obtaining is not usually a simple matter.

The pilot may hold any of three different licences and, if he wishes to instruct in piloting, must possess a fourth, while the ground engineer has his choice of five different categories, the last of which is divided into five sections. There are also licences for parachutists, balloon pilots, airship pilots, wireless operators and navigators and, in addition, there are certain certificates which are granted by the Royal Aero Club.

For each of these the requirements naturally differ, but the authorities require to be satisfied that the applicant possesses sufficient skill, knowledge and experience of the subject for which the licence is granted. Full details of these requirements will be found in this book, frequently in the form of abstracts from official documents, but the author has added much which elucidates the complication of official phraseology.

Individuals who are desirous of qualifying for any of these licences will find this book most useful. Much of the information given is nearly inaccessible to those who do not know where to look for it.

CORRESPONDENCE

To the Editor of the JOURNAL OF THE ROYAL AERONAUTICAL SOCIETY.

Hebrew Technical Institute, Haifa,

August 23rd, 1934.

Dear Sir,—In the introduction to his paper, "The Nature of the Torsional Stability of a Monocoque Fuselage," K. Sezawa refers to my paper "Die Torsionsstabilität des dünnwandigen Rohres" (Proceedings of the first International Congress for Applied Mechanics, Delft, 1924, and Z.A.M.M. 5 (1925) 235/243) saying that "owing to the certain apparent particularities on his part his solutions of equations are open to grave doubts."

Asked to specify his doubts, Mr. Sezawa wrote the following to me (literally):—

"*Your method of obtaining simply* (m_1-m_2) *from the equation* (V) (Z.A.M.M., *loc. cit.*) is not perfect because the equation (V) is 2×4th degree in m in general and the condition (VI) is arbitrary, so that the curves in Abb. 2 are not applicable to general problems.

The boundary conditions in your case are not sufficient so that your result is completely ambiguous. How would you solve the determinate problem with satisfactory end conditions (two kinds of end conditions for plates, etc.) on the line of your method of treatment?"

In reply :—

The principal aim of my paper was to calculate the smallest critical twisting moment possible for tubes of middle or large length ($l/a = C/a \geqq ca . 5$) putting the displacements in the form (3) first given by myself. That aim has been completely reached by the values of the curve Abb. 3, the calculation of which is independent of any boundary condition at the ends of the tube.

But it was not my intention to calculate the numerical values of the critical twisting moment for the very short tubes studied by Mr. Sezawa, the boundary conditions in this case being of great influence.

In consequence hereof, the example (VI)—consciously chosen as simply as possible and, therefore, having only one boundary condition $W = 0$ and only real values of m—only was to illustrate the graphical method used by myself and appliable even in the most general case, as shown afterwards.

However, this simple particular solution is not ambiguous; for it represents the case of a tube, the ends of which are supported, and clamped in a manner completely determined by the ratio G_1/w' which for each value of ϕ in $\xi = \pm l/a$ may unequivocally be calculated from the equations (I), (IV), (VI), (VIIa) and Abb. (2a)-(2d).

Now, I should like to prove that the graphical method applied by myself may even be used in the general case of complex roots of (V) :—

Putting $m = a + b . i$ (a, b real) c_0 may be got from (V) in the form :— $C_0 = F_1 (a, b^2, \epsilon, n) + ib . F_2 (a, b^2, \epsilon, n)$, F_1 and F_2 being algebraic functions of (a, b^2, ϵ, n). As c_0 must be real we have the condition :—

$$F_2 (a, b^2, \epsilon, n) = 0 \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$
$$\text{and } c_0 = F_1 (a, b^2, \epsilon, n) \quad . \quad . \quad . \quad . \quad . \quad (2)$$

From (1) we may calculate the value of b^2 for any value of a—which is best simply done by trying—and draw the curve $F_2 (a, b^2, \epsilon, n) = 0$ of Fig. 1.

By means of this curve it is then possible to eliminate b^2 in $c_0 = F_1 (a, b^2, \epsilon, n)$ and to get c_0 as a function of a alone (besides ϵ, n) in the form of $c_0 = F_1 (a, b^2, \epsilon, n) = \phi (a, \epsilon, n)$ graphically represented by Fig. 2.

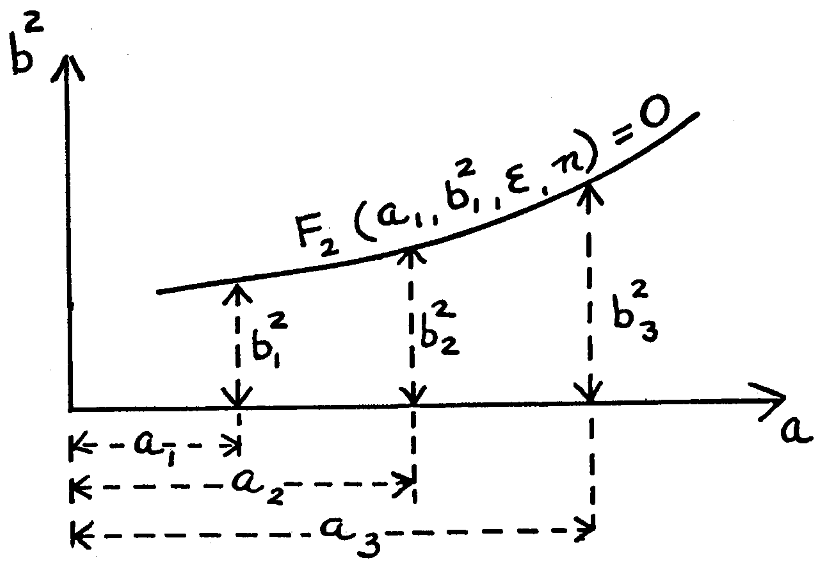

FIG. 1.

* The form of the curve Fig. 1 is only provisionally assumed.

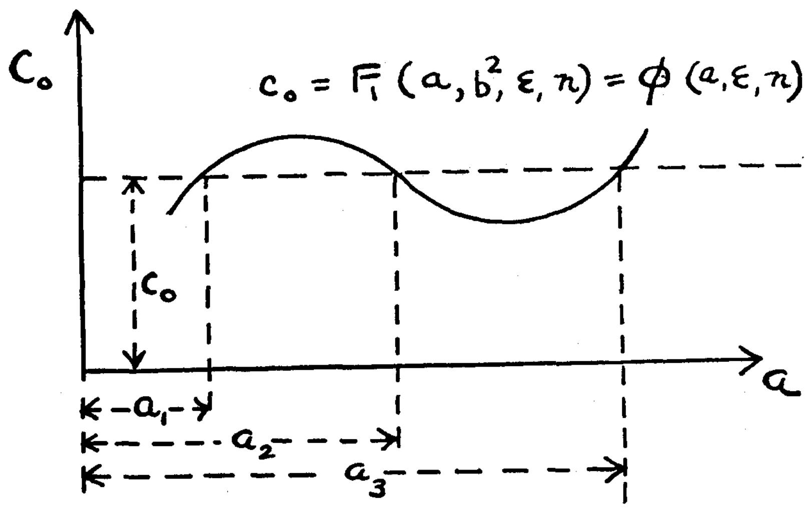

FIG. 2.

Now—if, *i.e.*, two roots $m_1 m_2$ of (V) are real and six: $a_1 \pm b_1 . i$; $a_2 \pm b_2 . i$; $a_3 \pm b_3 . i$ complex—we are able to find the former from Abb. (2*a*)-(2*d*) of my paper and the latter from Fig. 2 by determining $a_1 a_2 a_3$ graphically for any assumed value of c_0 and, then, taking b^2 from Fig. 1.

After this, we must vary c_0 so long until the condition of stability, *i.e.*, for the clamped tube ($w=0$, $w'=0$) condition (VII*b*) is satisfied, which always will be possible by applying a suitable method.

In opposition to the opinion of Mr. Sezawa, we see that the Abb. (2*a*)-(2*d*) derived without any boundary condition are always appliable for graphically determining the real roots m of (V); it must only be completed by Fig. 2 in order to find the complex roots $a \pm b . i$ of (V).

Believing that after this argument the results of my paper can no longer be doubted, I may be allowed to add some critical remarks on Mr. Sezawa's paper:—

With regard to the supported tube, he simplifies the boundary condition $G_1=0$ into $d^2w/dx^2=0$ neglecting the influence of Poisson's ratio σ. In my paper having proved that this influence is very great for the critical moment, I doubt whether it is permitted to omit the terms containing σ in the boundary conditions.

Besides, in his equation (3) of equilibrium the term:—T_2/a is lacking. By adding this term, the first element of the third line of (11) does not disappear and (12), (13), and the whole following calculation becomes much more complicated. I believe it possible that this lacking term may be of great importance and that, chiefly owing to the above mentioned facts, the experimental results differ so much from Mr. Sezawa's theory; for I cannot agree with Mr. Sezawa's opinion that the differences of Table V of -20, $+89$, -33, -38, -37, -71 per cent. of the calculated from the experimental results may be regarded as small discrepancies.

I have forwarded a copy of this letter to Mr. Sezawa.

Hoping that according to your kind letter you will publish this answer in your Journal as soon as possible, I remain, dear Sir, with many thanks,

Yours sincerely,

E. SCHWERIN.

https://doi.org/10.1017/S036839310011003X Published online by Cambridge University Press