REVIEWS

Strömungs-und Temperatur-grenzschichten. By ALFRED WALZ, Braun. *1966. 259 pp. DM 56.*

This book is basically a handbook for engineers who wish to make calculations on two-dimensional or axisymmetric boundary layers. It begins with a considerable amount of introductory matter including an 'engineering' derivation of the basic equations.

The main part of the book is devoted to the author's own methods for calculating laminar and turbulent boundary layers. One doubts if many people will use the laminar methods given, since many other approximate methods are known and indeed some 'exact' ones. However, if one is going to use the methods of the book for turbulent layers, those for laminar layers may be useful as a starting point (up to transition) since they are rather closely allied.

The main interest therefore lies in the calculation of turbulent boundary layers, by methods which the author has been developing and refining over the years. He makes use of the momentum-integral and energy-integral equations, together with empirical formulae for the skin friction and dissipation integral. Four thicknesses, namely displacement δ_1, momentum δ_2, energy δ_3 and density δ_4 are used. H_{12} denotes δ_1/δ_2 (the form parameter H of many authors) whilst the important ratio in this work is $H(= \delta_3/\delta_2)$. The method involves the solution of two ordinary differential equations for δ_2 and H and everything else is found as a result of these basic calculations. (Incidentally it is stated without discussion that these two are continuous at transition, so that δ_2 and δ_3 are to be continuous. The continuity of δ_2 is usually accepted but δ_3 might have had some discussion.) Extension to compressible flow is ingeniously devised but not seriously checked by experiment. The test comparisons with experiment for incompressible flows are really impressive—but only when a new empirical dissipation integral due to Felsch in a 1965 Karlsruhe Dissertation is used, not always otherwise. This takes into account to some extent the previous history of the flow by bringing in derivatives. Unfortunately Felsch's work is so recent that it has only just got into the book, and the important relations for its use are only given in a rather small graph, so that the most successful method is not immediately available for machine computation. In any case it has not been made perfectly clear exactly how it is to be used; all the other variations of the author's method are most clearly set out. It is not certain whether this variation can also be extended for compressible flow calculations.

No mention is made of Head's work on turbulent boundary layers. A recent comparison with experiment of several methods has been made by Thompson of Cambridge University, and Head's method was definitely the best. Unfortunately Thompson did not test Walz's methods; my friends in Germany tell me that Walz's and Head's methods are equally good, but it would be a good thing to compare them directly.

The author's methods seem to have been neglected outside Germany, and other workers should be made aware of them. Perhaps this book will make the work more easily accessible.

J. C. COOKE

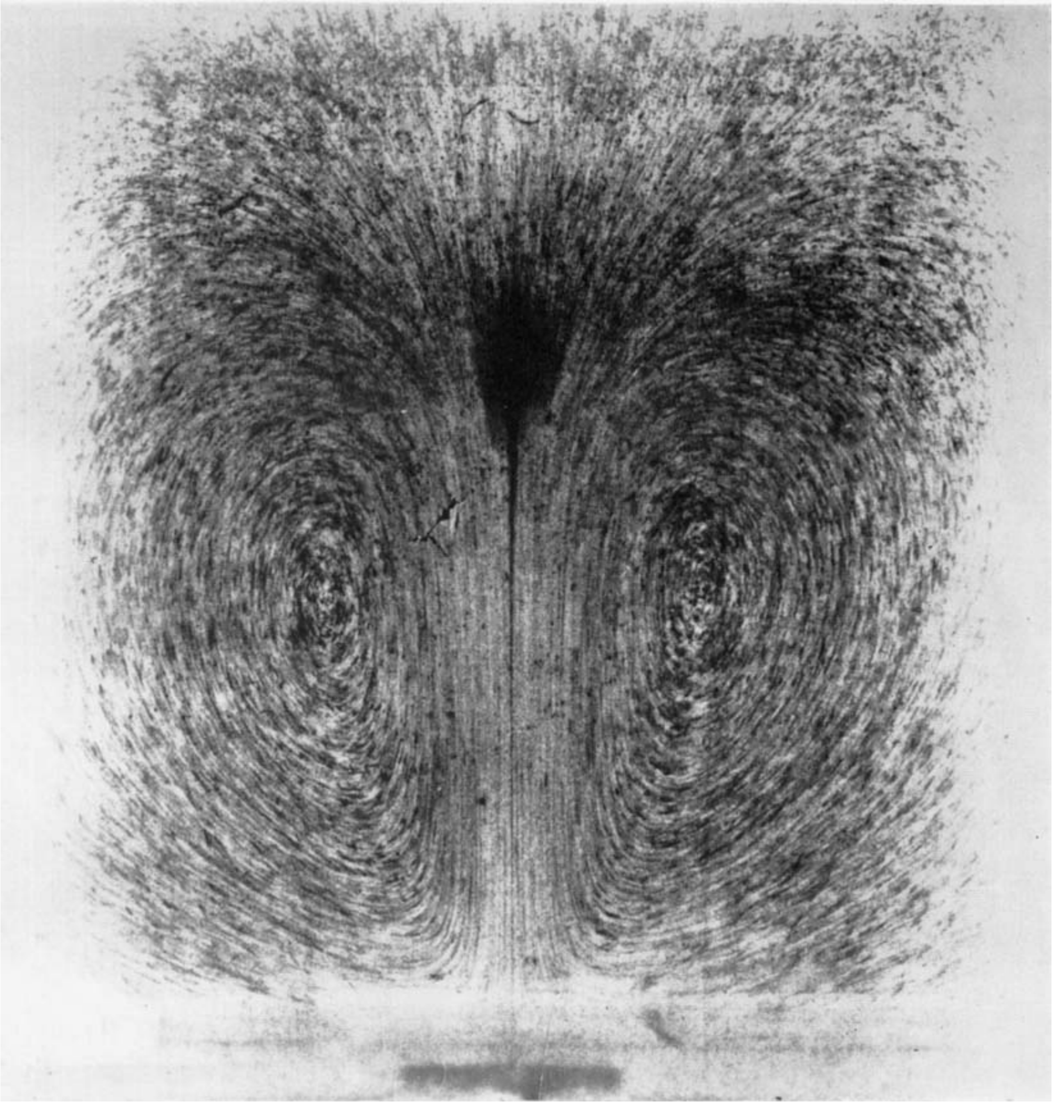
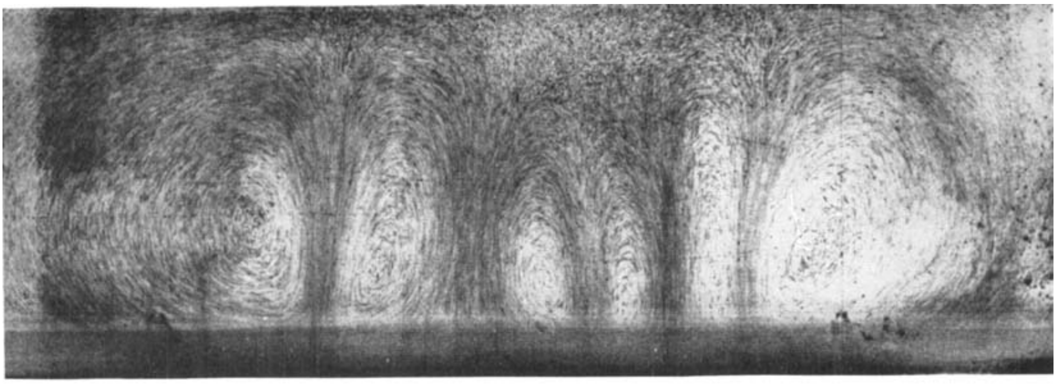
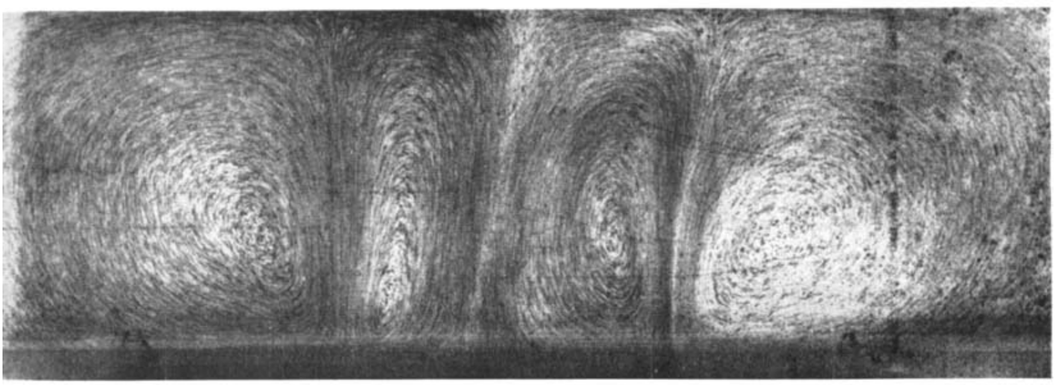


FIGURE 3. Visualization of the streamlines of a hot blob in a Hele-Shaw cell for the same parameters as in figure 2.



(*a*)



(*b*)

FIGURE 5. Visualizations of the streamlines in a Hele-Shaw cell for the same parameters as in figure 4 at (*a*) $t = 0{\cdot}025$; (*b*) $t = 0{\cdot}05$.