Int. J. Heat Mass Transfer. Vol. 6, pp. 251–252. Pergamon Press 1963. Printed in Great Britain.

DISCUSSION

ON A METHOD FOR THE DETERMINATION OF LOCAL CONVECTIVE HEAT TRANSFER FROM A CYLINDER PLACED NORMAL TO AN AIR STREAM, by D. A. VAN MEEL

THE main purpose of the above mentioned paper [1] was explicitly stated to be the description of an accurate method of obtaining by measurement the local heat transfer at the outside surface of a cylinder in cross flow. It is based upon using a thin platinum film, suitably painted and fired on a Pyrex cylinder, as a resistance thermometer to measure the outside surface temperature. One purpose of this discussion is to draw attention to the fact that such a method was successfully tried before in a similar situation, and the results published about two years ago [2].

In this earlier work [2], one platinum film measured the outside surface temperature distribution, and another the inside surface temperature distribution. With these temperature distributions as boundary conditions, the steady state heat conduction equation was solved. The coefficients in the solution were determined from a forty point Fourier analysis of the measured surface temperatures, and finally the local heat flux obtained. In particular, the heat transfer at the forward stagnation point was determined directly from the results of measurements. In [1] however, this quantity was computed from a well established correlation, and its value used to determine the constant γ [1]. Since this constant γ appears in the expression for the heat transfer at the other locations around the cylinder, such procedure to determine the local heat transfer really involves an adjustment of the measurements, so that the stagnation point heat transfer agrees with the well known correlation. Such adjustment was rendered necessary because of insufficient data when only one platinum film was used on the outside cylinder surface.

In conclusion, the method of [1] was reported about two years earlier in [2]. Moreover, it yielded insufficient data, and hence had to be supplemented with a well known correlation equation for the stagnation point heat transfer.

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BOOK REVIEW

The Laminar Boundary Layer Equations. N. CURLE, Clarendon Press, Oxford, 1962, 162 pp. 30*s*.

THIS new book, one of the series of Oxford Mathematical Monographs, is intended either for readers who are not yet familiar with boundary-layer theory and need an introductory text on the subject, or for those who are already experienced in the field but who require in one volume an outline of the more important methods of boundary-layer analysis which are currently available. The book should be of special interest to practising engineers because it emphasizes the more rapid, and from the engineer's point of view more useful, approximate methods of calculating boundary-layer characteristics.

In order to keep the book down to a reasonable size however, the author was compelled not only to omit discussion of many topics, such as three-dimensional boundary layers and mass transfer through boundary layers, but also to give only brief, sometimes inadequate, descriptions of some methods and to refer the reader to the original papers for further details. It is a pity, however, that a few pages were not devoted to showing how the solutions in two dimensions, which are discussed at length, may also be applied to problems in three dimensions when there is axial symmetry; this would have been more useful than the all-too-brief introduction to natural convection given in Section 6.12.

The first half of the book is concerned with incompressible flow. The differential equations which govern fluid flow in a laminar boundary layer are first introduced, followed by a discussion of the integral equations for momentum, kinetic energy and thermal energy, after which are given the transformations due to Crocco and von Mises. A feature of the introduction which should benefit engineers, among others, is an extensive, often enlightening, use of physical arguments to interpret the mathematics.

Analytical, numerical and approximate methods of