Int. J. Heat Mass Transfer. Vol. 15, p. 1440. Pergamon Press 1972. Printed in Great Britain.

BOOK REVIEW

Progress in Heat and Mass Transfer, Vol. 3. Edited by E. R. G. ECKERT and T. IRVINE. Pergamon Press, Oxford (1971). 560 pp. £10.

THIS book brings together as a single volume reviews of published work which have appeared annually in the International Journal of Heat and Mass Transfer from 1954 to 1969. There can be no doubting the comprehensiveness of this exercise, despite the editors' reservations about non-USA coverage in the earlier years and the difficulties of adequately dealing with the vast amount of literature available to them in the later years. It is difficult to believe that any work of significance can have been overlooked, and for that reason alone the volume provides a useful reference for what have surely been the peak years of heat transfer research.

A work of this nature provides in addition, useful statistical data which illustrate the trends of modern heat transfer research with some perhaps surprising indications. The first and obvious trend is the growth in the rate of published papers: from 112 in 1953 (reported in the 1954 review) to 642 in 1969. Noteworthy, however, is the tendency to level off in the last three years of the period covered by the volume at about this level after an all-time high of 720 in 1964. Too much should not be read from this observation, especially in view of the editors' statement by this time that they can deal with only a 'selection' of the available literature. But is it too much to hope that there is a limit to the number of significant papers which those of us working in heat transfer must face in a given year?

The reviews sub-divide the whole field of heat and mass transfer finally into 16 fairly well-defined categories (only 11 were necessary in 1954). The relative effort put into research in these areas has remained remarkably stable, at least as shown by the number of annual publications expressed as a percentage of the total, although nevertheless some interesting trends again emerge. Change of phase remains a growth activity, moving now slowly back to the once-for-all peak of 21 per cent it reached in 1955, presumably at the height of expansion of the nuclear power industry. Conduction on the other hand, despite recent attempts to rationalize contact resistances is a consistently declining activity. Surprisingly, natural convection has remained a stable continuing topic throughout the seventeen years covered by the review, representing remarkably consistently about 8 per cent of the annual published work.

The most surprising trend in this review is the clear decline, both relatively, and recently in absolute numbers, in the quantity of published papers listed under 'boundary layer flow'. From over 20 per cent in the early years papers in this category have declined to less than 5 per cent of the total. With the growth in the power of numerical techniques for solving the boundary layer equations and more sophisticated experimental procedures for obtaining data with which to compare predictions this surely would have been expected to be a growth area. It cannot be that no problems remain, for in our detailed understanding of turbulent flow in particular we seem little further forward than at the beginning of the period under review. Can it be that workers in heat transfer have admitted defeat in dealing with realistic boundary layer flows and are turning to the green fields of elliptic flows, which is one of the growth areas?

Turning again to the overall objectives of this volume: The Editors have produced a comprehensive and conscientious work of reference, clearly and logically arranged. Is it, however, ungrateful to question the value of the effort? There are over 7000 quoted references covered in rather less than 250,000 words, including the annual introductory remarks, so that on average each paper is dealt with in about 30 words. Inevitably, therefore many of the entries convey little more than an intelligent title; for example, 'Thermal stresses in bent tubes with rigidly supported ends are discussed' (1957, 4Q) and 'The critical Rayleigh number for the onset of flow in a spherical region of fluid has been studied' (1967, 30F, 35F). One can fairly question whether this type of representation of a paper, together of course with slightly larger descriptions of papers judged more significant, is of greater value than a really comprehensive bibliography like those to which the Editors continually refer us in the later years of this review.

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