Int. J. Heat Mass Transfer. Vol. 11, p. 1417. Pergamon Press 1968. Printed in Great Britain

BOOK REVIEWS

M. A. FIELD, D. W. GILL, B. B. MORGAN and P. G. W. HAWKSLEY, **Combustion of Pulverised Coal**. British Coal Utilisation Research Association. Price: 50*s*

BOOKS about "combustion" either reflect the particular and sometimes esoteric research interests of the author or are so encyclopaedic in their coverage that one is daunted by the richness and spread of the subject. Here is a book that was conceived in quite a different way, it is the result of a positive need to draw together and focus the research interests of the British Coal Utilisation Research Association (B.C.U.R.A.) in pulverised coal combustion. The urgency of understanding the processes taking place during the combustion of pulverised coal was sharpened by B.C.U.R.A.'s part in designing and commissioning a high intensity pulverised coal combustion chamber for the now sadly truncated Central Electricity Generating Board open cycle M.H.D. programme.

The authors started work in 1963 and have reviewed in an orderly and critical way the information necessary for constructing mathematical models of combustors fired by pulverised coal. This aim dictates the form and structure of the book. It is no criticism of the authors but rather an indication of the correctness of their intentions that the final chapter entitled "Mathematical models of combustion chambers" is the shortest and most tentative in the book.

The treatment starts with an outline of the combustion processes in which some justification for continuing research into pulverised fuel (P.F.) combustion is given, a detailed economic analyses of P.F. boiler construction and operation would have been a valuable addition here but was presumably thought to lie outside the scope of the work. After dealing with simple representation of combustion chambers in terms of "plug-flow", "stirred tank" and so on, the authors give a useful account of "Flow patterns and mixing". This chaper is followed by "Heat transfer", "Thermal decomposition", "Combustion of coal volatiles", "Reaction rate of carbon particles" and "Isothermal combustion of a suspension of coal particles". The vexed question of rate control in the combustion of P.F. particles is discussed fully and without prejudice; unfortunately the final conclusion, if such there be, is still obscure. The authors present in detail in appendix U (sic) their own mathematical model of combustion in the B.C.U.R.A. experimental plant. In fact throughout the main text and the several appendices new ideas and previously unpublished information is given which make this much more than a review but a valuable contribution to the study of P.F. combustion in all its aspects.

B.C.U.R.A. is to be congratulated on initiating and bringing to a successful conclusion the production of this volume, it is perhaps not too much to hope that other research associations will follow this lead and produce syntheses of work in their respective fields.

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FRITZ SCHULTZ-GRUNOW and RAYMOND CALY, **Heat Transfer of a Disc Rotating In an Enclosure**. Westdeutscher, Köln und Opladen (1967), (In German).

THIS small book contains a theoretical analysis of the convection heat transfer between a rotating disc and its enclosure in the laminar-flow regime and the results of experiments, conducted with a heated 15-cm dia. disc rotating in air, to verify the analysis. Since the theoretical work is based upon integral methods, temperature profiles in the gap between the disc and the housing were also measured in the experiments.

Within the limitations of the objectives set forth by the authors, the book presents an analytical solution which fits the experimental results of several experimenters. From the analysis one can predict the Nusselt number and the rate of heat transfer from a heated rotating disc to its housing. The agreement between the theory which the authors propose and the experimental results cited by them is encouraging and from this point of view the book can be considered successful. In engineering practice, however, the majority of problems will not be in the laminar flow regime and the authors have neither considered heat transfer in the turbulent flow regime nor the limits over which the results which they have presented are applicable. Thus, the authors have delineated the conditions under which the boundary layers at the rotating and the stationary surfaces are separate and under which the boundary layers are merged, but the range of Reynolds numbers covered is exceedingly narrow and the reader will not learn at what values of Reynolds number and gap size transition begins. One would, therefore, hope that the goal in future studies of this sort will be to establish the limits over which the theoretical model is applicable.

The experiments described in the book have been carefully done and have yielded consistent and reproducible results of high accuracy. They give a clear understanding of the heat transfer in the various boundary-layer configurations that can exist in laminar flow in the gap between a rotating disc and its housing and will undoubtedly be of value to future research workers.

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