Int. J. Heat Mass Transfer. Vol. 19, pp. 451–452. Pergamon Press 1976. Printed in Great Britain

BOOK REVIEWS

Proceedings of a Conference on Heat and Fluid Flow in Steam and Gas Turbine Plants. Institution of Mechanical Engineers, 331 pages, £13.00.

THIS collection of papers should be considered as a progress report on the efforts currently underway in various research establishments. The conference has pulled together a good representation of foreign and British work on wet steam flow in turbines, and the resulting papers provide a good illustration of the level of that technology. The paper by Gyarmathy, *et al.* (C66) is excellent and stands out with a few other papers on the topic of condensation in steam turbines.

The remaining papers on compressors (axial and centrifugal) and radial inflow turbines are generally not up to professional standards. The work reported has been done elsewhere as long as 40 years ago and no real advancement is achieved. In fact, Papers C53 and C112 report conflicting results on experiments that were conducted on the same experimental rig. The work on centrifugals is amateurish and does not warrant inclusion. Despite the book's title there is only one (quite good) paper on heat exchangers.

The editing of the book is confusing. No attempt has been made to sort the papers by subject so that different topics appear consecutively. The conference discussions are included but are listed in alphabetical order by the discusser's name. It is sometimes impossible to find out which paper is being discussed. The IME could improve here.

For those interested in wet steam flow in turbines, the book is a good buy.

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Y. B. ZELDOVICH, O. I. LEIPUNSKY and V. B. LIBROVICH. **Theory of Unsteady Combustion of Solid Propellants.** Nauka, Moscow (1975). 132 pp., 39 diagrams, 8 tables, 87 references.

THIS short book arose out of the lectures given by one of the authors in January 1970 at Princeton University, U.S.A., in the laboratory of Professor Summerfield, but it contains additional material especially on the experimental side. In view of the fact that the subject matter has obvious connections with military applications, it is not surprising that the discussion remains rather fundamental, or that most of the references are old ones. However, since many of the original ideas in solid-propellant combustion theory originated in the Soviet Union, it is interesting to have a connected account of the work done there.

From the point of view of Heat and Mass Transfer, the combustion of solid propellants, as it is treated in this book, is a process of one-dimensional transient heat conduction with non-linear heat sources. None of the problems which are discussed in the book present any mathematical difficulty, now that numerical methods are available for solving the equations; however, it is analytical, and therefore approximate, methods which occupy the main attention of the authors. These were, after all, the methods which the originators of the ideas had to use.

Modern theories of the combustion of solid propellants, whether steady or unsteady, stretch beyond the contents of this book in two main ways: the chemical-kinetic models involve a large number of species and simultaneous chemical reactions; and turbulence, radiation and multi-dimensional effects are all considered. Numerical methods are inevitably employed for the quantitative working out of the implications of all the assumptions. However, even users of powerful computer programs can often be aided by the checking of their results, either by computation or in imagination, against the implications of much simpler models. The presence of the book allows this to be done. Quite apart from the scientific material, the book is also valuable for Chapter 1, which is a brief account of the history of the science of the burning of solid propellants. The long and brilliant association of Academician Zeldovich with this work makes the chapter an authoritative one.

D. B. SPALDING

A. FORTIER, **Mecanique des Fluides et Transferts de Chaleur et de Masse par Convection.** (1975) Masson, Paris. 236 pp.

THE AUTHOR of this short book in French, on fluid mechanics and convective heat and mass transfer, is a professor at the University of Paris; his book is the outcome of lectures given there and at the Institut National des Sciences et Techniques Nucleaires. The level of the lectures was apparently that of an advanced but introductory course, probably equivalent to M.Sc. or early postgraduate level in the English system. The presentation of material and the clarity of writing are of an adequate standard; and a student who made a thorough study of the book would have a fair idea of what the subject is about and how it can be tackled analytically.

The book has a number of shortcomings, amongst which the most obvious is the lack of an index. Surely no technical book of this character should be allowed to appear without one. The reader is further denied a nomenclature; on the whole, terms are defined clearly when first introduced in the text, but it takes time for the reader, browsing in the middle of the book, to verify that the Margoulis number is the French equivalent of the Stanton number.

The material includes studies of laminar and turbulent convection in circular pipes, between parallel plates and in two-dimensional boundary layers, with constant and variable properties. The approach is mainly analytical and conventional, but with sparse reference to experimental results and practical applications. Integral or profile methods of solution are used in places, but there is no use of nor reference to finite-difference numerical methods and computer programs. This omission is perhaps the most serious example of a general failure to provide a balanced and up-to-date account of the subject or adequate references to published work.

Nor can the book escape criticism on matters of technical correctness. For example, on p. 42, in a discussion of fully-developed laminar flow between parallel plates, it is claimed that thermally developed flow requires that the wall heat flux be specified and not the wall temperature, whereas of course either of these types of boundary condition is allowable. The error arises from the inadequacy of the author's definition of the term "fully-developed" ("établi" in French) on p. 19.

Because of these shortcomings, it is impossible to give any recommendation of this book other than that of the above opening paragraph. Moreover it is right to point out that there exists a book of similar title, published in 1966, covering similar (but more) subject matter at a similar level, but which succeeds in presenting the subject in a more balanced, methodical and appealing way ("Convective Heat and Mass Transfer" by W. M. Kays).

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