Marangoni convection in microgravity is supported by a couple of review papers on thermal control, one concentrating on heat pipes and including recent terrestrial applications. Electronics is addressed by four papers, all by industry-based authors and all reviews: one deals with heat transfer in a crystal growth process and the remainder discuss thermal control practice (these are virtually the only industry-source contributions in the volume). There is a contribution on temperature distributions during heat bonding and one on molecular clustering, a phenomenon occurring during phase change, which can produce local material states with widely varying physical properties.

The section on high heat-flux technology is concerned primarily with boiling and condensation, with research reporting, particularly on boiling, being more in evidence than elsewhere within the volume. This is further served by a perceptive review of CHF by Katto and a critical study of boiling enhancement by Fujita and Ohta. In contrast to the latter, a review of condensation by Witte is little better than a set of undergraduate level lecture notes. An excellent presentation of heat transfer in aeropropulsion by Simoneau is notable for its emphasis on the relationship between ultimate applications and research stratregy with some convincing statements of future needs. There is also a contribution on circulating fluid bed combustion, whose relevance to the seminar's subject was somewhat tenuous.

The section on high-performance heat exchange devices covers a wide range of topics, including heat transfer enhancement (both mechanical and electrical), the fouling, vibration, and numerical modeling of shell and tube heat exchangers, compact heat exchanger development for automotive and waste-heat recovery applications, high free-stream turbulence effects on convective heat transfer, and a weighty contribution on turbulent heat flux structures in wall-bounded shear flows from Hishida and Nagano. Again, virtually half of the papers are reviews.

The final section is, with one exception, free of reviews: that is on natural convection in high-technology applications by Lior, and nicely structured it is, too. Two papers address current solar energy work in the United States, and two more consider radiation in heat exchangers and packed spheres. More interesting is a study of plasma fluence–surface interactions in fusion reactors, which explores the thermal shielding effect of material vaporized from the inner wall of a plasma-containing vessel.

The physical presentation of this material is generally good. The volume is in hard covers and well-bound, and although the industrial papers are reproduced directly from authors' submissions with the consequent variations in typeface, the are all clear and commendably error-free.

It is not easy to judge who will find this publication valuable. There is certainly much of interest, but the field it covers is so broad that I suspect most full-time researchers will find little or nothing of novelty in their own specialisation. To this reviewer the most useful feature is the insight it gives into heat transfer research directions of the United States and Japan (albeit two years ago) and the overview of fields outside one's normal activity. It may be that those casting round for new areas of research may particularly welcome this! Most workers will, I suspect, find it sufficient to borrow a library copy.

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Heat Transfer in Turbulent Fluid Flows

By A. Zukauskas and A. Slanciauskas

New York: Hemisphere Publishing Corp., 1987. Pp. 294. $89.95

This is one of the series of "Experimental and Applied Heat Transfer Guide Books" edited by Professor Zukauskas. It describes research work at the Institute of Problems of Energetics at Kaunas, Lithuania, and is a research monograph rather than what one would normally call a Guidebook or Handbook. The first chapter is a five-page introduction, but it is clearly intended to set the scene for specialists rather than to educate students. Subsequent chapters, although uniformly written and well cross-referenced, could equally well have been published as separate research papers.

Chapters 2 to 7 deal mainly with boundary-layer heat transfer, with special reference to constant-pressure flows ("flat plates"). Chapter 3 gives a detailed description of the experimental techniques used at the authors' Institute. Topics include overall effects of fluid properties and temperature differences on heat transfer rate in gases, water, and oils and more detailed studies of velocity and temperature profiles. The data are clearly presented and extensively discussed.

The problem of boundary-layer heat transfer at high Reynolds numbers can be encapsulated as the problem of finding the behavior of turbulent Prandtl (Pr) number (1) in the viscous or conductive sublayer, $y^+ \mathrm{Pr} < 40$, and (2) in the fully turbulent part of the flow where Pr_t should not depend on the molecular Pr, i.e., on the type of fluid considered. In simple cases the effect of Pr is simply to change the additive constant, c_0 say, in the logarithmic law of the wall for temperature, but since Pr—and of course ν—can be a strong function of absolute temperature one must allow c_0 to be a function of wall temperature T_w and of a heat-transfer parameter that implies the variation of T with y. Unfortunately, the present book does not fully achieve this synthesis—which, of course, is unpleasant to those who believe in completely dimensionless presentation of results. Nevertheless, the book contains a large amount of painstakingly acquired data that appear to be of high quality; it will, therefore, be of use to heat-transfer specialists who are prepared to devote some time to reanalyzing the data in their own preferred forms. The extensive tables of data in the appendix will make this relatively easy.

The book has been competently translated, about the only non-trivial confusion being the description of a sublayer fence skin-friction gauge (typically 0.05 mm high) as a "plank." The translation of the eight-page index, a peculiarly tedious task, has also been done well. Roughly half of the 120 references are to Soviet work: one must be especially careful to avoid saying "Russian" because several of the cited papers are in Lithuanian (whose apparent similarity to Finnish is unlikely to help many readers and is in any case not to be relied on, since they are members of quite distinct philological families).

In summary, this is a book for specialists in heat transfer: it represents a significant contribution by well-respected workers, and will be a useful source of data, especialy for those concerned with variable-property heat transfer.

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