Chapter IV is devoted to the theoretical and experimental research of some complicated turbulent jet flows such as cocurrent streams and wakes with a longitudinal pressure gradient, radial slotted converging and diverging streams and those in a counter-flow.

In Chapter V the approximate integral methods, discussed in the previous chapters, are used for the solution of problems on propagation of turbulent nonisothermal gas jet flows of a variable composition. The solution is presented for turbulent gas jets of variable composition for two cases: (1) when the turbulent and diffusional Prandtl numbers are equal to unity and (2) when they are equal to each other, but differ from unity.

In the monograph the results of new works of the author and his co-workers are reported, the available data of the theoretical and experimental investigations of turbulent jet flows are also summarized. By the integral methods, the author from a general standpoint manages to solve a wide range of problems on isothermal and nonisothermal streams of incompressible liquids and gases, both known and still having no satisfactory solution. For most solutions numerical results are obtained which are given in the form of graphs and tables. For some problems just tentative solutions are presented and only the initial prediction formulae are suggested. As a whole, the integral methods on prediction of turbulent jets and wakes considered in the monograph represent a general procedure for a solution of basic problems, arising when investigating various jet flows. The results obtained together with those from other works in the same field are of use for practical calculations of turbulent jets and wakes. The book contains an extensive list of 264 references.

The monograph may be recommended for research workers and engineers engaged in aerodynamics.

Yu. Anoshkin
B. A. Kolovandin

Proceedings of the 1970 Heat Transfer and Fluid Mechanics Institute (Edited by T. Sarpkaya). Stanford University Press, Stanford, California, 1970, 370 pp.

Except for the necessary changes in names and titles, the review of the 1968 Proceedings of this Institute by P. Bradshaw (*Int. J. Heat Mass Transfer* **12**, 981, 1969) applies as well to the current volume, particularly as he remarked it to be "simply a collection of research papers covering a rather wider field than one would find in any one journal". The diversity is greater than ever, and it perhaps implies the dilemma of attempting to select papers on the basis of quality at the expense of any unifying theme. In the face of this heterogeneity this review is essentially limited to a citation of the content of the proceedings.

Kearney *et al.* present the effect of free stream turbulence on heat transfer to a strongly accelerated turbulent boundary layer which is in the laminarizing regime; the effects of the laminarization parameters strongly reduce the heat transfer but the free stream turbulence effect is unimportant. Azer considers analytically the ratio of the diffusivities for heat and momentum for flow in an annulus by the use of an eddy model; most of the details are contained in a referenced paper. Liu presents a method for the calculation of simultaneous radiation and conduction in the entrance region of a channel; the theory applies, however, only for constant density and the computed results consider a transparent gas so that the radiation effect enters only through the asymmetric wall temperatures.

McCoy presents experimental results on pool boiling with an oscillatory system pressure and demonstrates interaction when the oscillation is of the magnitude of the bubble release frequency to produce higher fluxes at the same temperature difference. Remenyek considers the streaming of the adjacent fluid by oscillating bubbles and the development of bubbles in oscillating fluids. Abdelmessih measured mean and instantaneous surface temperature with dropwise condensation; the fluctuations of temperature are shown to be high compared to the vapor to average surface differences. Zakkay presents film cooling for a supersonic turbulent boundary layer and indicates greater relative effects than are indicated by the usual predictions for subsonic flow.

Bradley presents integral analyses for turbulent internal flows and shows good results for ducts, pipes, and conical diffusers. Ziemiak applies the finite difference form of the Navier–Stokes equations for two dimensional turbulent flows and illustrates the entrance region of a parallel plate channel; the methods used are of the same nature as those proposed by Spalding's group, essential details relative to the maintenance of iterative stability are not included in the paper. Zelazny considers momentum and mass transfer in co-flowing streams; the turbulent Schmidt Numbers, from 0·6 to 0·8, appear to be higher than expectation for mixing phenomena such as considered. Powell gives a variation of the Patankar and Spalding calculation for turbulent boundary layers, with some modifications of mixing length near the wall to account for blowing at the wall; good results are indicated by comparison to existing data. Mayne uses the same Patankar method for turbulent boundary layers at hypersonic conditions and shows good agreement with measured heat transfer. Ehlers presents an analysis for flow through a cylindrical tube in the slip flow regime and shows agreement with existing results for the pressure distribution.

Reddy presents a new similarity parameter for non-equilibrium nozzle flows. Davy evaluates approximations in the analyses of reacting stagnation boundary layers with injection and demonstrates some agreement with measured wall heating rates. Emanuel uses matched asymptotic expansions to calculate radiative transfer in an optically thick gas between concentric spheres. Finkleman analyzes radiative flows about pointed bodies. Chien analyzes flow in a cylindrical shock tube with radiative energy loss evaluated on a spectral basis and shows agreement with experiment.

Owens presents an analysis for transient heating by periodic electrical dissipation in plates and cylinders. Otterman analyzes for particulate velocity and concentration profiles for the flow of a suspension over a flat plate. Dawson presents a slightly different numerical approximation for the convective terms in the numerical solution of the Navier–Stokes equations; time dependent solutions are given for the flow around a cylinder at low Reynolds number. Ky gives an analyses of the magneto-hydrodynamic laminar flow part a flat plate. Dalle Donne gives experimental results for heat transfer from the roughened interior surface of an annulus to turbulent gas flows and achieves a correlation for a range of thread-type rib roughness elements.

Certainly almost everyone will find something of interest in this variety of topics but few so much as to feel a permanent need for the volume. Further, most of the papers are perhaps shorter than adequate for comprehensive understanding, averaging 15 pages of reduced photo-offset reproduction, in content rather equivalent to eight pages of this Journal, in which, or in a similar publication, they could have perhaps found more congenial surroundings.

R. A. SEBAN