discussion. This section of the book would serve as an excellent discussion of CHF for a course in which two or three hours of class time might be devoted to this topic. The review of the literature here is excellent also.

The second category which Dr. Tong concerns himself with is the design equations. These are all complex, computer determined, functions of quality, mass velocity, pressure and system geometry. They are completely empirical and must be approached with caution. The possibility of misprints is very great as the equations are unfamiliar, dimensionally inconsistent and impossible to check. Example problems are not worked out so that one can, in general, check the arithmetic. In addition, empirical factors are used in the equations which are not clearly defined in the text. For instance the eddy diffusivity in equation 2.4 is unclear. It is not clear either what the boiling length is in equation 2.25. Is it the distance from the first boiling point or point of bulk boiling? If it is first boiling how does one determine the superheat at this point? Questions of this kind can only be answered by going back to the original references.

Another problem arises in the use of the rod bundle equations. The calculation of the local mass velocity and quality in the equation depends on the use of company classified codes for pressure drop, void, mixing and flow redistribution. These equations as they stand, are useless for calculating without methods of calculating mass velocity and quality for substitution in them. This information is not provided nor is it ever mentioned.

In spite of these criticisms, this is a valuable monograph. The general discussion of CHF and the listing of the recommended design equations removes much of the mystery from the thermal design of nuclear reactors. This book is useful for describing thermal and hydraulic design methods for reactors and showing the precision characteristic of these methods.

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JOHN G. COLLIER, **Convective Boiling and Condensation.** McGraw-Hill, 1972, 421 pp. £9.00

THIS book presents an excellent summary of the general purpose tools which are used to solve problems in the gas–liquid two-phase flow area. The book opens with a discussion of two-phase flow and presents the standard, overall calculation methods. Flow regimes and flow regime maps are discussed. Recommendations are made for when to use each correlation scheme. The sections in this book on subcooled void and pressure drop are unique. Recommendations are also made for calculating pressure drop in fittings.

The section on boiling reviews the heat transfer correlations and critical heat flux data from an overall point of view. Specific recommendations for design are not made for various pieces of equipment, though the characteristics of the different correlations are mentioned. In this respect the monograph of Tong supplements this work as he does make specific recommendations. Mention is also made of heat transfer beyond burnout and various means of raising the critical heat flux.

The book is unique in that a section on condensation heat transfer is also included. Both dropwise and film condensation are considered. Because of the space limits characteristic of general heat transfer texts, this section goes beyond what is usually included in a chapter on condensation and covers the effect of shear stress, condensation in tube bundles and the effect of non-condensible gases.

In summary this book is unique both from the point of view of combined two-phase flow and heat transfer coverage and the good taste displayed in the choice of material to present. Problems are given at the end of the chapters so that the book can be used for a text in a course. The book is self-contained and has the material needed for a graduate course in two-phase flow and heat transfer such as might be given to mechanical, chemical or nuclear engineers.

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CHRISTIE J. GEANKOPLIS, **Mass Transport Phenomena.** Holt, Reinhart and Winston, £8.00, 495 pp.

THIS book is primarily concerned with the principles of mass transport phenomena. The author emphasises the analytical approach of formulation and solution of mass transfer problems rather than applications *per se*.

The book begins with a review of the fundamentals of transport phenomena which will be helpful to those who have received no formal education in transport phenomena. The first three chapters elaborate the aspects of mass transfer in gases and liquids, with or without reaction. Useful methods of prediction of diffusion coefficients of gases and liquids are included, although nothing has been mentioned about the predictive methods for diffusion coefficients in highly viscous solutions. No mention has been made of the abnormal diffusive transport rates in macromolecular solutions. The section on multicomponent diffusion is a welcome addition but it is surprising to find that the established matrix generalisation techniques [H. L. TOOR, *A.I.Ch.E.Jl* **10**, 448, 460 (1964)] are not mentioned. There is a section on steady state multicomponent diffusion of gases but the corresponding section for liquids is absent although prediction methods for diffusion coefficients in liquids find a place.

The next chapter on mass transport in solids is very valuable particularly since previous texts on the same subject have almost exclusively dealt with gases and liquids. The chapter on unsteady state diffusion provides information which is well documented in monographs of Crank or Carslaw and Jaeger. The chapter on mass transfer coefficients in laminar and turbulent flows has a worthwhile section on the definitions and inter-relation of different mass transfer coefficients. The ideas of convective diffusion transport are simply introduced and clearly illustrated.

The problems of interphase mass transfer are next considered and the calculation procedures for the design of

continuous two phase mass transfer processes are subsequently discussed. The book ends with a well written chapter on the basic methods in analog computing.

One of the useful features of the book is that it is fairly self-contained in a sense that after formulating a problem in mass transport phenomena, the pertinent mathematical tools are immediately introduced, which may be either analytical (such as Laplace transforms) or may involve numerical methods which in turn may involve machine computation. Actual computer programmes have been included for some problems. Another good feature is an extensive list of unsolved problems with occasional useful hints. A welcome effort has also been made to introduce the reader briefly to some advanced topics in the field.

The book is not completely without errors or ambiguous statements. For example, on p. 265, the volumetric flow rate should have been calculated on the basis of v_{ave} rather than v_{max}, although the final result appears to be in the correct form. On p. 266, short contact times for mass transfer are wrongly identified with large Reynolds number. Some self-contradictory statements appear in the same paragraph on p. 266. The asymptotic penetration theory solution is first recommended for $Re > 100$, whereas later on it is recommended for non-rippling conditions, the latter corresponding to $Re < 25$. Some minor typographical errors creep in occasionally. However, these are easily rectifiable minor comments.

The author is to be congratulated on producing an attractive and well-written book. We strongly recommend the book to undergraduate students.

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F. J. BAYLEY, J. M. OWEN and A. B. TURNER, **Heat Transfer.** Published by Nelson. £4.95, 438 pp.

THIS work is quite traditional in organization and also largely so in coverage. It is a first-level textbook. An introduction is followed by three chapters on conduction, three on convection, brief ones on radiation and change of phase and a concluding chapter concerning heat exchangers. The mood is pragmatic, both in the brief development of basic conservation equations and in a strong emphasis on practical results. Each chapter has a supply of problems, often quite abstract, but frequently drawn from practical applications.

In conduction, the unusual steady state cases are given, followed by a detailed treatment of finite difference methods. After a brief treatment of transients, a several page introduction to finite element analysis is given.

Convection is introduced through a motivated writing of the continuity, Navier–Stokes and energy equations, in differential form. They are generalized for the results of similarity, described in terms of turbulence parameters and reduced to boundary layer form. The commonly cited boundary layer solutions, along with the laminar–turbulent analogy, occupy the following chapter.

Then a short presentation of engineering correlations is followed by a relatively long and detailed application of numerical methods to boundary layers. This information is welcome. However, it is of surprising detail, compared to the usual level of the book's penetration into current topics.

The brief chapter on radiation is disappointing. The usual classical quantifications of the behaviour of surfaces and of gases are followed by only four pages telling how to do other than the most reductive problems. Even this material is the form of the out-dated electric analogy and is in too brief a form to be readily useful to the student either in understanding radiant exchange or in gaining confidence by doing problems having a semblance of realism. Most books do much better than this.

Boiling and condensation receive brief and mainly descriptive treatment. This material is probably adequate to meet the attention these matters usually receive. The treatment of heat exchangers is very brief but, I think, conceptually quite clear and adequate. The writers introduce the simpler "effectiveness" idea very well. The appendix on properties seems adequate to the needs of the book and will perhaps retain some reference value for it's users.

In balance, the presentation is clear and it should be a good teaching tool. It will require occasional amplification by those teachers who seek to motivate by bringing students to the level of solving somewhat diverse and realistic problems.

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