

Basic Mechanisms in Two-phase Flow and Heat Transfer

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This volume contains 14 papers presented at the 1980 ASME Winter Annual meeting, held in Chicago. There are equal numbers of papers on the topics of two-phase flow and two-phase heat transfer.

Some of the papers report studies related to the improvement of a basic understanding of the mechanisms of two-phase flow. In this category are two papers on waves in annular flow, and another on interfacial energy dissipation. The latter paper is primarily concerned with computational aspects of the problem.

Two papers are concerned with flow through nozzles and venturimeters. In the nozzle flow study, related to water reactor loss of coolant accidents (LOCA), steam-water mixtures were discharged from pressure up to 13.44 MPa under conditions that produced critical or choked flow. Good agreement between the experiments and predictions using the Henry-Fauske and Burnell methods is demonstrated. The venturi study relates to two-phase mass flow metering, which is relevant to a number of industrial applications although this study was partly orientated to their use in geothermal bore holes. Effects downstream of the venturi are shown to have a greater influence than suggested by most previous studies.

The final two papers on the fluid mechanics of two-phase flow are on the topics of 'lower plenum voiding' and two-phase flow at a T-junction. The first of these will be of interest to all concerned with LOCAs. The second paper, on T-junctions, tackles an aspect of interest to all involved in the design and

operation of pipeline networks carrying two-phase flow, namely 'what is the off-take composition?' At least for the case of annular flow, some progress is being made.

Turning now to the seven papers on two-phase heat transfer, a study of the condensation of vapour bubbles rising and condensing when flowing up through sub-cooled water is reported. Computed values and experiment are in good agreement, although, this reviewer was uncertain as to the extent that this is due to 'occasional adjustments to suit a particular environment'. Direct condensation of vapour in pools of water is the subject of two further papers; the studies are relevant, in the first instance, to the design of 'pressure suppression systems' of boiling water reactors.

Two other papers relate to direct contact condensation also. One reports the use of finite difference methods to prediction of direct contact condensation in water jets; the comparison with experiment is quite impressive. The other concerns condensation on falling liquid films in counter-current flow.

Finally, two papers relate to boiling, particularly in relation to the wetting and re-wetting problem.

This volume should be essential reading for people involved in research and development on water cooled reactor LOCAs. It also contains much useful information for all research workers concerned with two-phase flow and heat transfer.

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Books received

Transition and Turbulence, *ed. R. E. Meyer*, £12.00 (\$18.00), pp 245, Academic Press Inc (London) Ltd

Engineering Calculation Methods for Turbulent Flow, *P. Bradshaw, T. Cebeci and J. H. Whitelaw*, £18.60 (\$45.00), pp 331, Academic Press Inc (London) Ltd

Numerical Methods in Heat Transfer, *ed. R. W. Lewis, K. Morgan and O. C. Zienkiewicz*, £28.00 (\$78.00), pp 536, John Wiley & Sons Ltd

Fundamentals of Heat Transfer, *F. P. Incropera and D. P. Dewitt*, £22.15, John Wiley & Sons Ltd

Flow-Induced Vibration Design Guidelines, *ed. P. Y. Chen*, \$30.00 (ASME members \$15.00), pp 143, American Society of Mechanical Engineers

Implementation of Finite Element Methods for Navier-Stokes Equations, *F. Thomasset*, \$33.60, Springer-Verlag

Unsteady Turbulent Shear Flows, *ed. R. Michel, J. Cousteix and R. Houdeville*, DM89 (\$41.50), pp 424, Springer-Verlag

Inclusion of a publication in this section does not necessarily preclude subsequent review

Heat Transfer and Fluid Flow in Rotating Coolant Channels, *W. David Morris*, £13.00, pp 228, John Wiley & Sons Ltd

Finite-Difference Techniques for Vectorized Fluid Dynamics Calculations, *ed. D. L. Book*, DM72 (\$33.50), pp 226, Springer-Verlag

7th International Conference on Numerical Methods in Fluid Dynamics, *ed. W. C. Reynolds and R. W. MacCormack*, DM52 (\$24.20), pp 485, Springer-Verlag

Handbook of Multi-phase Systems, *ed. G. Hetsroni*, \$64.00, pp 1503, Hemisphere Publishing Corporation