NUCLEAR SCIENCE AND ENGINEERING: 27, 605-606 (1967)

Book Reviews

Proceedings of the 1966 Heat Transfer and Fluid Mechanics Institute. Edited by Michael A. Saad and James A. Miller. Cloth bound. Stanford University Press, Stanford, California. 444 pp. $12.50.

The Heat Transfer and Fluid Mechanics Institute concerns itself with current fundamental research in fluid mechanics, heat transfer, and related fields, according to the editors of the present volume, and in this reviewer's opinion, this is an accurate summation of the contents of the present volume. The 1966 meeting, the 19th Annual Meeting of the Institute, was held at Santa Clara, California, June 22-24, 1966, jointly sponsored by the University of Santa Clara and the US Naval Postgraduate School. National technical societies cosponsoring the Institute are: American Institute of Aeronautics and Astronautics; American Institute of Chemical Engineers; American Society of Heating, Refrigerating, and Air-conditioning Engineers; and American Society of Mechanical Engineers.

A very broad range of papers is included, which may be broken down roughly into the following topic areas: 1) boundary-layer flows including stability, non-Newtonian flow, and shock-boundary layer interactions; 2) two-phase flows and change of phase; 3) free and forced convective heat and mass transfer; 4) wakes and separated regions, and radiation gas dynamics; 5) special problems such as vortex flows, fluid motion in modified force fields, radiation heat transfer, and heat transfer in restricted areas.

To this reviewer, the quality of the papers seems uniformly high. The bulk of the material presented is oriented toward high-speed aerodynamics applications and, hence, from the viewpoint of the nuclear scientist and engineer, perhaps would be of interest mainly in space propulsion applications. Of the 24 papers in the book, 10 are in this general topic area.

On the other hand, there are single papers on natural convection in a closed space, liquid-metal flow and heat transfer, condensation in nozzle flow, wall turbulence, effect of electric fields on gas heat transfer, gas dynamics of particulate-gas flows, and the behavior of the free surface of liquid under off-axis acceleration. In addition, there are three papers concerned with two-phase flow phenomena, and three (including one with abstract only) concerned with thermal radiation. There are no papers directly concerned with nuclear technology or techniques.

In this reviewer's opinion, the book should definitely be available on the shelves of technical libraries in the area of coverage that includes fluid flow and heat transfer. It is a questionable item for those concerned only with nuclear technology.

Frederick G. Hammitt
Department of Nuclear Engineering
The University of Michigan
Ann Arbor, Michigan

September 22, 1966

About the Reviewer: Professor Hammitt has been at the University of Michigan since 1956; first with the Mechanical Engineering Department and more recently with Nuclear Engineering, where his research interests have been in fluid flow and heat transfer. Earlier, he had about ten years' industrial experience in design and development of turbomachinery. His graduate training was at Pennsylvania, Stevens, and Michigan.

Neutron Dynamics and Control. Proceedings of Symposium at University of Arizona, April 5-7, 1965. AEC 7 Symposium Series, USAEC Division of Technical Information, Oak Ridge, Tennessee. David L. Hetrick and Lynn E. Weaver, Coordinators. (May 1966). $4.50.

Neutron Dynamics and Control is the state-of-the-art compilation of papers presented at The Symposium on Nuclear Engineering at the University of Arizona in April, 1965. These Proceedings are the sequel to *Reactor Kinetics and Control,* the papers resulting from a similar conference in 1963.

In the selection of papers for a conference, sometimes individual papers are difficult to classify or to fit into preselected topic areas. In this volume, the papers fall into five general categories with a few exceptions. These are nonlinear stability, optimal control, pulsed-neutron measurements, reactor-noise analysis, and large power burst reactor phenomena.

At the conference, and reflected in the papers, particular excitement was generated in new concepts and treatments of reactor stability. New, and undoubtedly later to be proven elementary, nonlinear stability critera of coupled cores fill about one-third of the volume. To be "in," one must now discuss stability in terms of Lyapunov, Welton, and Lagrange; Nyquist and Bode are dead.

The old school dies hard, however, particularly in the field of space-time dynamics. The struggle of those experimenters and theorists who are attempting to extend point-source lumped reactivity kinetic concepts to the more complex larger reactors with those who have almost completely abandoned these techniques to think in terms of spacial kinetics and modal concepts, is recorded between the lines of the conference proceedings. The two schools are typified by the interpretation of the now well-known experimental result that neutron flux oscillations corresponding to a localized oscillating absorber seem to be functions of both the frequency of oscillation and the position of the neutron detector.

Gyftopoulas ("Some Applications of Mathematical Methods to Nuclear Engineering at MIT") asks the question "Are the parameters of transfer functions space dependent?" Rajagopal ("Measurement of Local Kinetic Parameters in the Saxton Reactor"), Kylstra, Gallagher, and others, say "Yes." Rajagopal presents several curves and interpretations whereby using a local mechanical absorption-type oscillator—having a fixed assigned reactivity—he