BOOK REVIEWS

Selection of books for review is based on the editor's opinions regarding possible reader interest and on the availability of the book to the editor. Occasional selections may include books on topics somewhat peripheral to the subject matter ordinarily considered acceptable.

Multiphase Transport Fundamentals, Reactor Safety Applications

Author T. N. Veziroğlu

Publisher Hemisphere Publishing Corporation, Washington, D.C.

Pages 2932

Price $350.00

Reviewer Barry Ganapol

The Multiphase Transport Conference held on April 16-18, 1979 is essentially a continuation of the Two-Phase Flow and Heat Transfer Symposium of 1976. The need for a conference of this nature arises out of the importance of multiphase flow phenomena in the energy field, in particular in safe energy production. The emphasis of the conference was on the exchange of ideas concerning analysis and experimentation in multiphase flow. As we can imagine, a review of a conference of this magnitude is at best a difficult task; however, I will attempt to provide you with a summary of the contents.

The papers were grouped into the following general subjects and appear in five volumes:

Volume 1
- Multiphase Phenomena
- Multiphase Fundamentals
- Mathematical Modeling

Volume 2
- Boiling
- Condensation
- Heat Transfer
- Pressure Drops

Volume 3
- Instabilities
- Reactor Safety and Applications

Volume 4
- Pumping
- Gas/Particle Systems
- Fluidized Beds

Volume 5
- Flow in Porous Media
- Experimental Techniques
- Workshop Reports

The five volumes contain 132 papers and 7 workshop reports. Given the relatively short duration of the conference (three days), it is almost impossible to cover each topic in great depth. One finds a rather diverse collection of papers under each section. For example, in the Mathematical Modeling section the papers deal with general considerations such as numerical two-phase flow calculational schemes and specific applications such as mathematical modeling of heat transfer in a rocket motor nozzle.

To provide researchers in multiphase flow with a means to express their opinions on some open questions and on the future of specific topics in multiphase flow, seven workshops were conducted. During these sessions, participants were invited to express their views on current open questions and to propose problem areas for future research. Of particular interest to me was the discussion of the "ill-posedness" of some multiphase flow equations. The general view was expressed that the question of "ill-posedness" arises from applying linear analyses to nonlinear equations and therefore "the problem itself is ill-posed."

For the serious researcher in multiphase flow, this five-volume set can be a valuable resource as it contains a current view of the multiphase flow field. I hope another conference will be held on the subject.

Barry Ganapol (BS, mechanical engineering, University of California, Berkeley; MS, Columbia University; PhD, engineering science, University of California, Berkeley, 1971) worked at Eidgenoessisches Institut für Reaktorforschung in Switzerland and at Saclay in France for three years before joining the Reactor Analysis and Safety Division at Argonne National Laboratory. Since 1976, he has been a professor in the Nuclear Engineering Department at the University of Arizona and enjoys it very much.

Radiological Significance and Management of Tritium, Carbon-14, Krypton-85, Iodine-129 Arising from the Nuclear Fuel Cycle

Publisher Nuclear Energy Agency, Organisation for Economic Co-Operation and Development (1980)

Pages 221

Price $19.00

Reviewer Geoffrey G. Eichholz

This booklet presents the report by a small group of experts from western Europe and North America on the subject indicated in the title. It presents, in concise form,

a very convenient up-to-date summary of the source terms, environmental pathways, control procedures, and cost estimates of four of the most significant nuclides arising in nuclear reactor operations. While tritium has been the subject of various detailed reports and symposia, it is difficult to find as much detail about the other nuclides elsewhere in the open literature. The study attempts to evaluate for each nuclide the costs of the various control options, the radiation "detriment" saved by the application of controls and an evaluation of the cost-benefit in monetary terms for each control option. The detriment is expressed in terms of the collective effective dose commitment to a global population of 10 billion, with terms included for dose commitment representing genetic harm to later generations and a small measure for risk of fatal skin cancer.

The report explains the optimization procedure adopted, the dose commitment, and the assumptions for limiting individual risks. The greatest problem, to my mind, arises from the procedure for allowing for realistic risk probabilities. The expert group estimates the dose for the most exposed individuals and then applies a factor of 0.7 to correct for overestimates. A more appropriate procedure would employ a probability distribution to obtain more valid dose values. For American readers it may be of interest to see the methodology applied, not to a remote site in the western prairies, but to the region within 2000 km around a postulated site in West Germany. Control procedures are listed for both fuel reprocessing plants and all major reactor types including the fast breeder. The decontamination factors assumed are conservative. Waste disposal is discussed and included in the cost assessment, but the treatment is too general and qualitative to be of more than indicative value, particularly as the nuclides discussed here are rarely expected to be treated separately by the methods listed. Tritium, if extracted, potentially can contribute appreciably to the overall management cost.

Overall the book presents a good overview of retention technology for the four nuclides and of the cost and dose impact of their recovery.

Geoffrey G. Eichholz is Regents' Professor of Nuclear Engineering at the Georgia Institute of Technology, which he joined in 1963. He obtained his PhD in physics at the University of Leeds, England, and was awarded the DSc degree in 1979. Eichholz is a fellow of the American Nuclear Society and a past chairman of its Isotopes and Radiation Division. He has edited the book Radioisotopes Engineering *and is the author of* Environmental Aspects of Nuclear Power *and* Principles of Nuclear Radiation Detection, *both published by Ann Arbor Science Publishers. His research interests include the migration of radioactive wastes, environmental surveillance problems, radiation detector development, industrial radiation application, nuclear materials technology, and the health physics of nonionizing radiations.*