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.

Nuclear Power Reactor Safety

Author E. E. Lewis

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Reviewer Reiner Papp

During the past couple of years, the main thrust in nuclear energy has steadily shifted toward areas related to the nuclear fuel cycle, such as waste management. Due to the "wait and see" attitude of the U.S. policy makers with respect to the fast breeder program, even the crucial issue of fast reactor safety ceased to be the primary target of public concern. But after the Three Mile Island (TMI) event, even the safety of light water reactors (LWRs) has become an issue again, and the public is well aware of the general uncertainty that was also expressed in a recently published National Academy of Sciences report on risks associated with nuclear power. This is well in line with some findings of the TMI accident analysis such as that related to the extent of the cladding-water reaction, which seemed to be on the order of 30 to 40%, even though the most extreme assumption prior to the accident amounted to only 5%.

All of this points to the necessity of an in-depth understanding of the basics of reactor safety; *Nuclear Power Reactor Safety* by E. E. Lewis is the right step in this direction at the right time. The author states in the preface to this book that his aim is "to provide a coherent treatment of the primary facets of reactor safety within a single volume of reasonable length to which a student, faculty member or practicing engineer can turn for a unified overview of reactor safety." He has done exactly that. The initial chapters are concerned with a review of reactor physics, heat transport, reactor kinetics, and quantitative risk assessment. In addition to discussing reactivity feedback effects and reactivity coefficients, Chaps. 5 through 8 are concerned with fuel element behavior, coolant transients, and loss-of-coolant and reactivity-induced accidents. The final two chapters deal with the containment of radioactivity that may have escaped from the primary system envelope and with the radiological consequences of an accidental release of radioactivity to the biosphere. Appendixes containing dose-conversion factors, Bessel functions, and conversion factors between the old English and the SI system are included at the end. In addition, study problems are given at the end of each chapter.

The text is mainly directed toward courses in reactor safety on a graduate level by offering a thorough review of the main safety features of the main reactor types (LWR, fast breeder reactors, and gas-cooled reactors).

A sound undergraduate background in nuclear engineering seems to be sufficient for the understanding of the text. It is felt that this book can both provide a timely training in nuclear safety fundamentals and enable readers to cope with new safety problems.

Reiner Papp is a visiting professor in the Department of Nuclear Engineering at The University of Arizona; he is doing research in risk analysis and alternate fuel cycles. He is on sabbatical leave from the Nuclear Research Center in Karlsruhe, Germany, where he was active in risk analysis of the nuclear fuel cycle, environmental problems of fast breeder reactors, and physical measurement on the Karlsruhe Fast Critical Assembly.