Elements of Nuclear Reactor Engineering. By L. Wang Lau. Gordon and Breach Science Publishers, Inc., New York (1974). 239 pp. $29.50.

Textbooks in nuclear engineering, particularly at the introductory level, have been falling behind in covering the modern aspects of nuclear power. The modern light water reactors are complex enough to require lengthy descriptions and many illustrations if one hopes to present simply an overview of the systems in use. Also, to include an introduction to high-temperature gas-cooled reactors, liquid-metal fast breeder reactors, and perhaps some aspects of fuel reprocessing and waste storage, the author must accept the need for many additional pages of material that, to the student, frequently appears almost unrelated to the traditional basic ideas of cross sections and four-factor formulas. *Elements of Nuclear Reactor Engineering* has been written by a former nuclear engineering professor, now associated with a major utility heavily committed to nuclear power generation. A person with such a background should be well qualified to update and improve the teaching material in this area.

Dr. Lau has devoted a significant portion of his textbook to consideration of the nuclear power system: Chap. 4, "Nuclear Reactor Plant—General Considerations," Chap. 11, "Fuel Cycle and Economics," Chap. 12, "Progress in Reactor Engineering," and Chap. 13, "Criteria, Standards and Guides." The remaining nine chapters are typical of introductory texts, with chapters on nuclear reactions, fission, the neutron cycle, etc. To assemble all this material in a one-semester text of only 239 pages is not a simple task.

Extensive use is made of solved problems, selected so that solution of the problem often continues development of the topic covered in the chapter. Students will find these solved problems very useful, but the instructor will be less pleased with the available problems for assignment. Only three or four unsolved problems are included at the end of a chapter, and such a small number will undoubtedly have to be supplemented by the instructor. As mentioned earlier, the author devotes four chapters to current developments in the nuclear field but does not attempt to offer any problems in these areas, solved or otherwise. The most disappointing aspect of the book is that the opportunity to interface recent developments into the traditional textbook format is, for the most part, omitted. A few problems in the chapters on heat transfer and shielding deal with power or research reactors, but most of the recent developments are offered only as descriptive material.

The first chapters treat the fundamentals of nuclear reactions, sources, fission, etc. in the traditional fashion. A rather unique approach is made in Chap. 6, "Reactor Flux Distributions and Criticality Conditions." Without dealing with the usual preliminaries, such as a spherical homogeneous one-group system, the author treats four cases:

1. a bare homogeneous one-group system in cylindrical geometry
2. the same system with reflector
3. the two-group homogeneous system with reflector
4. the one-group heterogeneous cell.

The author has been able to dramatically condense what is frequently a lengthy section, and, with some guidance from his instructor, the student should be able to handle this material. Point kinetics receives four of the ten pages devoted to reactor kinetics, but only a half page, without equations, is used to discuss xenon and samarium poisoning. In heat transfer, five pages are devoted to graphs of properties of materials. These graphs do not specifically apply to the solved problems and could have been listed by reference. Very few references to supporting material are given in any of the chapters, a severe shortcoming for a condensed textbook. The chapter on shielding has an interesting section on "Rules of Thumb," as well as the traditional sections on materials, sources, and geometrical considerations. In Chap. 11, the recent separation-nozzle method for enrichment is discussed in the fuel cycle, along with gaseous diffusion and gas centrifuge techniques. The final chapter, "Criteria, Standards and Guides," tabulates U.S. Nuclear Regulatory Commission general design criteria, safety guides, and proposed American National Standards safety classes. The student will find this material very useful in making a literature search for a term paper.

The author has undertaken two major departures from the standard introductory nuclear engineering textbook: condensation of subject material and the introduction of systems and practices of the nuclear power industry. This is a formidable undertaking, and the student who uses *Elements of Nuclear Reactor Engineering* will probably need to supplement this text with class notes and library material.

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