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 Reactor Engineering (3rd Edition)

Authors Samuel Glasstone and Alexander Sesonske

Publisher Van Nostrand Reinhold, New York (1981)

Pages 830

Price $39.50

Reviewer Robert Hockenbury

This text introduces the reader to the field of nuclear engineering and its application to electric power generation. Topics covered include neutron physics, reactor kinetics, transfer functions, reactor systems, radwaste, heat transfer, thermal hydraulics, environmental effects, and safety analysis.

It serves as an important stepping stone in the education of nuclear engineering majors and as a vital reference for other engineers working in the nuclear industry. In view of the current shortage of nuclear engineers, the latter consideration becomes even more important than in the past.

To address all the many aspects of nuclear engineering, some topics are treated in a simplified manner, which still describes the basic physical processes involved. The reader should recognize this general approach and refer to more advanced material when greater detail and/or more exact methods are required.

The chapters on reactor physics, kinetics, and safety analysis are quite satisfactory as introductions to advanced courses. For example, Chap. 11 briefly highlights fault-tree analysis but cites its major limitations and includes comments from a recent review of the Reactor Safety Study by the Lewis Committee. The sections on neutronics, slowing down, and resonance interactions contain the principles of phenomena, which are quite complex when considered in detail. It is gratifying to see that a familiar standard has been updated to maintain its worth in the changing field of nuclear engineering.

Robert Hockenbury is an associate professor in the Department of Nuclear Engineering at Rensselaer Polytechnic Institute. He teaches courses in reactor analysis, reliability, and risk assessment. His primary research interests concern the development and application of reliability methodology to nuclear power plant systems. He is a member of the Society For Risk Analysis, the American Nuclear Society, and the American Physical Society.

Fusion Plasma Analysis

Author Weston M. Stacey, Jr.

Publisher John Wiley & Sons, Inc., New York (1981)

Pages 376

Price $32.95

Reviewer Robert T. McGrath

With this text, the author has taken steps to ensure that engineering education keeps pace with the rapid advances in magnetic confinement fusion research. The early chapters provide a compact but complete presentation of fundamental concepts in plasma physics. Attention then turns to essential elements of fusion plasma analysis that are not usually included in plasma physics texts. These include plasma heating and radiative losses as well as plasma wall interactions. The introductory chapters are well-organized treatments of traditional topics while the latter portions of the text strongly reflect current activity in magnetic confinement fusion research.

The first four chapters familiarize the reader with basic concepts. After a brief introduction, which includes discussions of Coulomb collisions and electromagnetic theory, Chap. 2 is devoted to charged-particle motion in electric and magnetic fields. Standard but very readable treatments of particle drifts, adiabatic invariants, and particle confinement in mirror and toroidal fields are presented.

The next two chapters develop the mathematical formalisms for kinetic and macroscopic descriptions of the plasma that are used throughout the remainder of the text. The Boltzmann and Vlasov equations are introduced and collisional processes, including Fokker-Planck theory and Coulomb collisional energy transfer, are discussed in detail. In Chap. 4 the macroscopic plasma description is constructed with one fluid and magnetohydrodynamic models included. The presentations are complete, yet succinct.