BOOK REVIEW

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.

An Introduction to Nuclear Reactor Theory

Author C. E. Iliffe

Publisher Manchester University Press, Dover, New Hampshire (1984)

Pages 240

Price $34.00

Reviewer E. E. Michaelides

This introductory book on nuclear reactors is composed of 23 short chapters discussing the fundamentals of the atomic structure, radioactivity, neutron diffusion theory, and chain reactions.

The author presents the original experiments that triggered the nuclear age as they were performed by the pioneers of the field. Because of this, the book has historical as well as scientific value. The famous experiments by the Curies, Thompson, Becquerel, and Soddy are explained through the pages of this book to give the reader a good idea about the early advances in the field, how they happened, and their importance. The explanations and the language are simple enough for the unfamiliar reader to follow and understand.

A good part of the book is spent on neutrons and neutron diffusion. Neutron reactions are explained well and the reader has a good exposure to the concepts of cross section, resonance, and nuclear chain reaction. However, what should have been the crescendo, the nuclear reactor itself, is given only a short eight-page description.

The book is intended for the scientist who is unfamiliar with the fundamentals of the nucleus and nuclear reactions and has "come into the field of design and development of nuclear power stations" (this reviewer wonders how many such scientists are around). Some sections of the book will undoubtedly be useful to some engineers with little knowledge of the subject, but for most of those working in nuclear technology the material must be known. As a textbook it suffers from the inadequacy of the figures, and the blending of text and figures leaves a lot to be desired. Another shortcoming of the book is that everything presented, although significant, happened before 1956 (and most before 1940), leaving the reader with the erroneous impression that nothing fundamental occurred in the last 30 yr to the theory and technology of nuclear reactors. In addition, nothing is presented about the nuclear plant itself, the thermodynamic cycle, or even the energy removal from the nuclear core.

Despite its shortcomings, the language of this book is excellent and the lucid exposition of the early advances is very informative. The book is easily read and can be of some help to engineers with deficiencies in the fundamentals or as supplementary reading for students in one-semester courses on power plants or nuclear energy.

Efstathios E. Michaelides has been at the University of Delaware since 1980 where he now holds the position of associate professor. He received a BA in 1977 from Oxford University, England, and an MS in 1979 and PhD in 1980 from Brown University. During 1986 he served as acting chairman of the mechanical engineering department at the University of Delaware. His research interests are in the areas of energy conversion, multiphase flow, geothermal energy applications, and particulate flows. He has published 65 articles and reports in the scientific and technical literature.