Book Review

Nuclear Power Materials and Applications. By Benjamin M. Ma. Van Nostrand Reinhold Company Inc., New York (1983). 529 pp. $39.95.

The stated primary objectives of the book are "(1) a textbook for undergraduate (junior or senior) and graduate courses in the United States and aborad,"[a] (there are numerous misspellings and awkward sentences throughout the book leading to the conclusion that the text has been poorly edited) "and (2) a reference book for the research and development of nuclear energy." How well these objectives are met is the question to receive attention.

There is certainly a wealth of information on nuclear materials that is well referenced and documented. Although the references are usually 10 to 15 years old, the information is appropriate and for the most part current. The text covers nuclear fuels as well as substances serving neutron moderating, reflecting, and blanket functions. Included also are coolants, control elements, shields, and safety-system-related materials. Applications are mainly concerned with the various types of fissioning reactors; however, there is limited discussion of fusion devices and radioisotope power generation systems. The effects of the nuclear environment on the physical, thermal, and electrical properties of the materials are well discussed.

Discussions of the effects of radiation on materials are found throughout the text. However, there are a couple of chapters devoted to understanding the manner in which radiation interacts with matter and some of the consequences resulting from such interactions. This material is very appropriate from the standpoint of a textbook for students and should contribute to an understanding of the process known as radiation damage.

[a]Copied as printed.

Fissioning fuels, uranium, plutonium, and thorium, in their various forms, receive considerable attention in the book. The compounds of the fuels are referenced by the manner in which they are produced: by their nuclear, physical, thermal, and mechanical properties and by their use in present and predicted reactors. There is a wealth of information concerning fuels that should be very useful to students in nuclear engineering.

The descriptive material in the first part of the text on fission and fusion reactor systems may be necessary, but it is very elementary and incomplete. It introduces the student to some of the terminology that is useful later in the text. However, the information on materials can best be assimilated by those who have a good understanding of reactor systems, thus making the first part of the text of little use.

It is recommended that students in nuclear engineering have this book in their library as it is a good reference book.

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July 22, 1983

About the Reviewer: Pete Pasqua is professor of nuclear engineering and head of the Department at the University of Tennessee, Knoxville, an appointment he has held since 1957. Additionally, in the recent past, he has served on the research staffs of the Oak Ridge National Laboratory, of the Redstone Arsenal, and of the Rohm and Haas Company. Dr. Pasqua's graduate training in mechanical engineering was at Northwestern University.