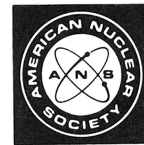


# BOOK REVIEWS

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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.



## **Turbulent Forced Convection in Channels and Bundles**

*Authors* S. Kakaç and D. B. Spalding  
*Publisher* Hemisphere Publishing Corporation (1979)  
*Pages* 1132  
*Price* \$92.50  
*Reviewer* Mario D. Carelli

This book is a collection of research papers plus review lectures presented at a seminar organized by the North Atlantic Treaty Organization Advanced Study Institute, Istanbul, Turkey, July 20 to August 2, 1978. A total of 52 contributions from universities and research laboratories in the U.S., and Western and Eastern Europe are included, with a large preponderance (70%) of the contributions being general review lectures, offered by some 20 internationally recognized authorities in their fields.

The purpose of the seminar and of this book is to provide a comprehensive state-of-the-art review of the thermal-hydraulic problems encountered in the design of heat exchanging equipment. Most of the contributions (especially the lectures) are of fundamental nature and of general interest to the thermofluids designer. Some specific applications to internal flows (jet engines) or the three-dimensional flow field around ships' hulls are presented; however, by and large, the great majority of the presented material deals with flow and heat transfer in nuclear reactors, with particular emphasis on the behavior of the fuel rod bundles comprising the reactor core.

The material in the two volumes is arranged in about a dozen subdivisions, which include prediction of turbulent forced convection, fundamentals and models of turbulence, effects of property variations on forced convection, turbulent forced convection in liquid metals, interaction of radiation with forced convection, transient forced convection, augmentation of heat transfer, measurement techniques in turbulent flow, and two-phase forced convection. In the final section, 14 invited lecturers present suggestions for further research.

As one would expect, the depth and breadth of the various sections vary considerably, reflecting more the interests and expertise of the invited lecturers than the amount of work performed in the field. For example, cov-

erage of transient heat transfer and two-phase forced convection is scant, while the subject of turbulent heat transfer augmentation enjoys a quite extensive and deep presentation. The sections on turbulent forced convection predictions and on fundamentals of turbulence are well balanced and provide a very good and clear exposition of the fundamentals.

A major asset of this book is its up-to-dateness; this reviewer found in his specific area of expertise—liquid-metal fast breeder reactor core thermofluids—that the broad picture painted by the various contributions still reflects current problems. Extensive reference lists accompany almost every single contribution. The very nature of this book makes it inappropriate to singularly review the individual articles. However, an exception must be made for the literary style adopted by Spalding when translating an oral lecture into a written exposition. The various slides are reproduced verbatim and are then followed by a text hitting and amplifying the various points summarized in the slide; the result is an exceptionally clear presentation. Many long technical articles (and the reader) would benefit from this approach.

Minor flaws of this book are repetitions and overlappings among different lectures (which, on the plus side, give different views of the same subject), and text figures which in some articles are freely interspersed within the reference list. A letdown for the reader is the final section where invited lecturers are supposed to elaborate further research needs; rather than an organic discussion as one would expect from a very distinguished panel, it amounts to a quick jotting down and reenumeration of what was presented in the respective lectures.

Overall, the lectures and papers collected in this book provide at the same time the fundamentals for the novice and the in-depth information and updated state-of-the-art for the long timer. The book could be used by teachers and students as a reference/consultation source, but in the opinion of this reviewer it is mostly recommended as excellent reading and a source of material of permanent value to reactor core designers and researchers in forced convection heat transfer; definitely a book to be added to one's technical library.

*Mario D. Carelli (PhD, nuclear engineering, University of Pisa, Italy, 1966) is a fellow engineer at Westinghouse Electric Corporation Advanced Reactors Division, Madison,*

Pennsylvania. Prior to joining Westinghouse in 1969, he was associated with the University of Pisa and the Italian Fast Breeder Reactor Program. Dr. Carelli serves also as adjunct faculty professor at the University of Pittsburgh, where he teaches courses in nuclear technology. He is a recognized expert in liquid-metal fast breeder reactor (LMFBR) core design and liquid-metal heat transfer and fluid flow; he has authored over 50 publications in these areas. Dr. Carelli is an active member of the American Nuclear Society and of the International Association for Hydraulic Research, where he is responsible for program activities in LMFBR core thermal hydraulics.

### Innovations in Energy: The Story of Kerr-McGee

*Author* John Samuel Ezell  
*Publisher* The University of Oklahoma Press (1979)  
*Pages* 542  
*Price* \$17.50  
*Reviewer* J. N. Anno

This well-written chronology of the birth and evolution of one of the U.S.'s great corporations is truly an excellent work. It is, and will be, an inspiration to the present and future entrepreneurs in that it dramatically illustrates that private industry can still survive and grow in a country that, it sometimes seems today, has forgotten its economic backbone. I doubt, however, that this book is of a nature to be of general interest to members of the American Nuclear Society (ANS). In the first place, the title is misleading. Most of the story, and the history of Kerr-McGee, is founded on the petroleum industry. A relatively few pages are devoted to the expansion into other natural energy resources such as uranium. While the reviewer personally feels that the world, and especially the U.S., needs every bit of energy resource it can develop, ANS members could probably more profitably spend their reading hours in the technical journals. With this introduction, let me attempt to summarize this otherwise interesting book of approximately 500 pages in one much oversimplified paragraph.

Beginning in 1929 in Ada, Oklahoma, with the formation of the Anderson & Kerr Drilling Company, after years of struggling and with the genius, hard work, and some good fortune of its founders and employees, the Kerr-McGee Corporation reached the full attention of the general public in its pioneering efforts in the offshore oil industry (first offshore oil well successfully drilled out of sight of land in 1947). The corporation prospered, weathered the recession years of 1958 and 1959, and expanded into even more natural resource efforts. For example, in 1964, its uranium holdings were the largest in the country, and it owned the first private helium refinery. It had even spread into the fertilizer area. Nevertheless, petroleum remained and still remains the backbone of what had been termed by 1974 the "nation's most major independent oil company." Aside from mention of the nowadays seemingly common litigation and lawsuits survived

by the corporation almost since its inception, at the conclusion of the story (1977) one is left with the feeling that Kerr-McGee is a corporation whose officers have dared to make some bold decisions—to take the risks—and have received handsome rewards, not only for the stockholders and employees, but for the economic benefit of the citizens of the U.S.

*Dr. J. N. Anno is a professor of nuclear engineering at the University of Cincinnati and president of Research Dynamics Incorporated, a small research and development corporation. He has spent over 25 years in research and development activities, much of that in energy-related areas. From 1953 to 1970, he was employed by Battelle Memorial Institute, Columbus, Ohio, where he was engaged in primarily nuclear-oriented research. He is the co-inventor on four U.S. patents concerning a novel heat engine, and currently is active in materials research and production for fusion reactor blankets. Dr. Anno received his doctorate degree in physics in 1965 from the Ohio State University, and joined the nuclear engineering faculty at the University of Cincinnati in 1970.*

### Use of Argillaceous Materials for the Isolation of Radioactive Waste

(Proceedings of the NEA Workshop held in Paris, September 10–12, 1979)

*Publisher* Organization for Economic Cooperation and Development (1980)  
*Pages* 281  
*Reviewer* Raymond L. Murray

A reader who is interested in waste disposal but is weak in geology would do well to look up a few words in a dictionary before tackling this book. He will find that "argillaceous" refers to clay that is composed mainly of aluminum silicate and is used especially for brick, tile, and pottery. Shale is described as a compacted laminated clay. Bentonite, frequently mentioned as a barrier between metal waste canisters and a geologic medium, is defined as an especially absorptive type of clay. Perusal of the Foreword of the book reveals that argillaceous materials have low permeability and high sorption capacity, properties favorable for host media in the disposal of high-level nuclear wastes.

The collection of papers describes research and development progress and plans in several countries—the U.K., France, Italy, Sweden, and especially the U.S. Subjects reported on include heat transmission, mass transport, with emphasis on the migration of radionuclides, and geochemical properties such as composition, porosity, and thermal stability. Reports cover laboratory work, literature investigation, mathematical analysis, field studies, and designs of waste repositories. Although many data are being collected and analyzed, one gets the impression that much more remains to be done on this type of geological medium. This is understandable since most previous research and development was on salt and recent alternative studies have favored basalt and granite.