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.

Energy Policy and Public Administration

Author Gregory A. Daneke and George K. Lagassa

Publisher Lexington Books, D. C. Heath and Company, Lexington, Massachusetts (1980)

Pages 318

Price $29.95

Reviewer E. Michaelides

The book is a collection of nontechnical papers on the subject of energy policy and public administration. It attempts to cover a variety of subjects ranging from local to regional and national energy policies, but the papers lack any rigor in the conclusions, and sometimes appear to contradict each other. While there are undoubtedly articles worth reading, such as the one on public policy and efficient use of energy, many appear to be of little value for the further education of a scientist. It is apparent that most of the authors are unfamiliar with the technical aspects of energy. Many of the articles, in essence, advocate that the laws of physics may be violated by simply changing the funding patterns or the administration of energy policy. Thus, their desired goal will be achieved.

Efstathios E. Michaelides studied at the University of Oxford, England (BA, engineering science and economics, 1977) and at Brown University (MS, 1979, and PhD, 1980, engineering science). Since 1980 he has been an assistant professor at the University of Delaware, Department of Mechanical and Aerospace Engineering. His research interests are multiphase flow, energy conversion, geothermal energy applications, and irreversible thermodynamics. He has contributed ~25 papers to scientific and technical literature.

Convective Boiling and Condensation (2nd ed.)

Author John C. Collier

Publisher McGraw-Hill Book Company, New York (1981)

Pages 435

Price $59.50

Reviewer M. R. Bottaccini

Convective Boiling and Condensation is one of those rare books, difficult to read and to understand, which become classics. The author has done the very best job possible, given the state of the subject, and until a theory is invented, no better job can be done. The heterogeneous literature on two-phase flow lacks an organizing principle; designers have been known to suffer frustration and emotional rages as a result of their incapacity to structure knowledge into a semblance of order. The various theoretical models proposed are based on simple-minded momentum balances derived from trivializing assumptions. Little or no use is made of partial differential equations, and finite element analysis is avoided as though dangerous to the soul.

In spite of all the experimentation reported throughout the world, but especially in the United Kingdom and the Soviet Union, convective processes remain a mystery whose outer boundaries are well defined but whose interiors are unknown. What is one to do in such a situation? The obvious solution is the encyclopedic book, loaded with charts, tables, and empirical coefficients. All valid references up to publication time should be listed, and a complicated empirical structure should be built upon tenuous intellectual foundations. Not a good solution, and hard to follow, but with patience and a sharp eye, design information can be found, and with some intuition, understanding achieved. It follows, hence, that Collier's work defies praise: exhaustive? thorough? useful? well written?—well—the nomenclature alone has over 600 entries and there are nearly 700 citations to the literature.

There are four introductory chapters dealing with the basic models, with empirical treatment of two-phase flow, and with a relatively old-fashioned introduction to convective boiling. A mixture of basic thermodynamics and sophisticated experimentation characterizes them. Very thorough empirical descriptions of subcooled and saturated boiling heat transfer occupy the middle of the book. Two chapters on critical heat flux in forced convective flow present, for the first time, useful design information on what is still a research subject. For those two chapters, if for nothing else, the book is worth its price. Condensation is treated rather casually in a chapter built on the older literature.

The eleventh chapter is useful. Collier gives guides to improvement of the performance of boiling and condensing heat transfer surfaces. Two aspects are considered: first, methods for improving heat transfer coefficients and

second, methods for increasing critical heat flux for a boiling system. Multicomponent boiling and condensation, an enormous subject worthy of a book of its own, is examined briefly in the last chapter. Process industry engineers who struggle with multicomponent systems and mass-rate dependent evaporation will think this chapter is unsatisfactory and cursory. The readers of *Nuclear Technology* will find here a sufficient introduction to a peripheral subject.

All engineers in the power, petroleum, and process industries should have this book available, and each should try to read it. Whether each can master the material in a lifetime, and whether he can retain even a tenth of it is questionable. Luckily the author has provided a complete index that will relieve and refresh the memory.

M. R. Bottaccini, a professor of mechanical engineering at the University of Arizona for 23 years, is currently a professor at the University of Wisconsin-Platteville. A graduate of the Iowa Institute of Hydraulic Research, Dr. Bottaccini is a specialist in mechanical measurements with special emphasis on fluid and thermal processes in biology and is recognized as an expert on the fluid mechanics of the human body. He is the author or coauthor of more than 100 professional articles and of 7 books. Currently, he is engaged in the writing of a book on the hydromechanics of the lower urinary tract scheduled to appear in the spring of 1983.

Hazardous Waste Processing Technology

Authors Yen-Hsiung Kiang and Amir A. Metry

Publisher Butterworths, Woburn, Massachusetts (1982)

Pages 549

Price $44.95

Reviewer B. L. Cohen

Following a brief introduction, this book is divided into two parts: 320 pages on thermal processing technologies and 200 pages on treatment technologies. Most of the thermal processing part deals with incineration, including a review of the fundamentals, descriptions of the various types of equipment—multiple hearth, fluidized bed, liquid injection, rotary kiln, cyclonic, auger combustor, multiple chamber, and fume incinerators—their peripheral systems, and miscellaneous topics; it also gives brief discussions of several other thermal processing technologies, like catalytic and oxygen incineration, pyrolysis, calcination, wet air oxidation, etc. The part on treatment technologies contains chapters on physical treatment including adsorption, centrifugation, dialysis, electrodialysis, electrolysis, electrophoresis, filtration, flocculation, flotation, freeze crystallization, freeze drying, suspension freezing, high-gradient magnetic separation, reverse osmosis, air stripping, ultrafiltration, and zone refining; there are also chapters on chemical and biological treatment with similar breadth of coverage.

As evidenced by the above lists given as examples, the coverage is very broad. The descriptions are clear and concise, aided by hundreds of figures. There is a reasonable amount of technical detail, including many tables, but not enough to make the reading slow or uninteresting. Environmental aspects, economics, advantages versus disadvantages, and range of applications are also considered.

The principal shortcoming for nuclear technologists is that there is very little material applicable to radioactive waste management. According to the biographical material on the authors, neither is experienced in that field, and there is no mention of the special problems involved in handling radioactivity. There is no discussion of encapsulation, solidification with cement, bitumen, or urea formaldehyde, or any of the other packaging techniques used or proposed for nuclear waste.

In summary, this book provides an excellent summary of nonnuclear waste management technologies, but not a great deal of direct applicability in the nuclear field.

Bernard L. Cohen is a professor of physics at the University of Pittsburgh, former director of its Scaife Nuclear Physics Laboratory (1965–1978), past chairman of the American Physical Society (APS) Division of Nuclear Physics (1974–1975), and 1981 recipient of the APS Bonner Prize for research in nuclear physics. For the past eight years he has specialized in environmental aspects of nuclear energy with special emphasis on waste management, radon problems, health effects of radiation, and risk and risk aversion. He was 1980–1981 chairman of the American Nuclear Society's Division of Environmental Sciences.

Thermal Energy Storage and Regeneration

Author Frank W. Schmidt and A. John Willmott

Publisher Hemisphere Publishing Corporation, Washington, D.C. (1981).

Pages 352

Price $35.50

Reviewer Ozer A. Arnas

This book discusses a topic that has become important once again due to the challenges of the ENERGY AGE. Though not an academic textbook, it nevertheless has a number of example problems distributed throughout. These give credibility to the theory as well as the results of the various computer approaches taken in the text.

The book is original in the sense that it brings together a number of related topics in the context of storage and regeneration. Although well organized and technically sound, it does suffer from the difficulties of American/British choice of terminology, nomenclature, and pedagogy.

After a brief introduction of thermal energy storage, a detailed presentation of the single-blow operating mode is presented, which leads into a discussion of transient response predictions of heat storage units. The counterflow and parallel-flow regenerators are also given good coverage. The computational methods of regenerators are discussed in a special chapter. Topics of heat storage exchangers, packed beds, and design optimization complete the contribution of the authors. A last chapter on heat transfer and pressure