be of vital importance to fusion and magnetohydrodynamic power equipment, to magnetically levitated railroad vehicles, and are being considered for energy storage in a range of applications. The superconducting Josephson junction has "secured an important niche in the electronic hierarchy of advanced computer systems." Also, "the big science of high energy physics has made extensive use of superconducting magnets."

The ability of superconductors to operate at very high current densities offers the prospect of magnets with very compact lightweight windings able to produce high fields and high-field gradients. The problem of instability and the various techniques for stabilization have exerted the most influence on practical superconductor design. Also, protective techniques are required to ensure safe quenching of superconducting magnets.

The editors point out that materials development and performance in operating systems are the basis of the continued applications and economic viability of superconducting technology. A complete review of all materials technology is presented by leading authorities who were instrumental in the development of superconducting materials technology, which has mushroomed in the past decade. Technologies in this field, which were discussed only in the early 1970s, are now well beyond the prototype stage.

Adjunct professor of materials science and technology and nuclear energy at the University of California, San Diego, Massoud T. Simnad obtained his PhD at Cambridge University. He has held senior positions at GA Technologies and served as a visiting professor at the Massachusetts Institute of Technology.

He has authored or coauthored over 90 papers and 14 patents on nuclear fuels and materials.

Nuclear Power Hazard Control Policy

Author John C. Chicken

Publisher Pergamon Press, Inc.
Elmsford, New York (1982)

Pages 280

Price $15.00

Reviewer Gerald A. Schlapper

This book presents an analysis of factors that seem to have influenced the formation and organization of control of nuclear power in Great Britain. The presentation begins with a discussion of the technical nature of the hazards and of the legal and administrative framework that exists for control of these hazards. Following this introductory material, the main body of the publication addresses the influence exerted on the "hazard control" efforts by social and political factors.

Special emphasis is placed on those political groups that have developed interest in the problems of nuclear power. The author traces the history of these groups from their formation, some during the World War II time frame, to the events at Windscale. The analysis of policymaking and implementation includes discussion of the manner in which power and authority are exercised in society to influence decisions on technical matters. The author addresses the evolution of policy in a changing atmosphere of economics and conflicting ideas of morality. A model of a policymaking system that accounts for changes in the technical, social, and political environment is proposed.

While the text is primarily oriented toward developments in Great Britain, numerous parallels are made with events in the United States. This study is well referenced with over 750 specific references in the text and a bibliography of over 80 books, 30 reports, and a list of over 110 newspaper and journal articles. Reading of the text is somewhat difficult due to the small-sized type that was employed, I assume, to keep the size of this volume tractable. There is much more information contained in this publication than the number of pages indicates.

This book is not a publication for light reading and is recommended for senior level managers, regulators, educators, and others of a similar level. It is useful as a reference for individuals interested in the interplay of factors that control the formation and development of regulation of the nuclear industry not only in Great Britain but also in the United States.

After receiving his MS in nuclear engineering from the University of Missouri at Columbia in 1970, Gerald Schlapper joined the reactor operations staff of the University of Missouri Research Reactor Facility. Dr. Schlapper received his PhD in 1977 and remained on the staff of the Research Reactor Facility until January 1981, when he assumed his current position as a faculty member of the nuclear engineering department at Texas A&M University. During his career, he has served as a consultant to various government and private organizations.

Heat Exchangers—Theory and Practice

Authors J. Taborek, G. F. Hewitt, and N. Afgan

Publisher Hemisphere Publishing Corporation,
New York (1983)

Pages 992

Price $69.95

Reviewer Warren M. Rohsenow

This book is a collection of papers presented at the 1981 Seminar of the International Centre for Heat and Mass Transfer in Yugoslavia. The papers were selected to cover a large spectrum of heat exchanger applications.

The first 18 papers cover evaporation and condensation. The initial paper is a survey of problems in condensation and boiling. In flow boiling the Steiner paper neglects the forced convection contribution, and his proposed correlation departs from data by as much as 400%. Bonn presents detailed results for the effect on nonuniform peripheral heat flux on flow boiling, and three papers present results for boiling on enhanced surfaces in tube bundles. Bonn also presents critical heat flux (CHF) data for flow boiling of nitrogen and argon

but does not include the effect of velocity in a proposed correlation. In the argon data, small amounts of impurities produced a significant reduction in CHF. Other papers present data for evaporation of liquefied gases using twisted tapes and for heat transfer and pressure drop for evaporating helium in vertical channels. The effect of tube submergence and entrainment on shellside evaporation is covered. This topic is given very little attention in the published literature.

In condensation the pressure drop prediction was influenced strongly by the surface roughness effect on the friction component. An excellent survey of effect of noncondensing gas is presented.

Three application papers cover reflux condensers, thermosyphons, and falling film condensers.

Papers in the next section are on pressure drop and heat transfer in tube banks in staggered, in-line, and yawed banks. Two papers by Zukanskas present comparisons of various kinds of surface augmentation on tube bundle performance.

Test results are presented for the effect of upstream grid-generated turbulence on fluid-elastic instabilities in tube bundles. A computer program is developed for predicting deflections and stresses in flow-induced vibrations in heat exchanger tubes.

Nine papers treat air-cooled and compact heat exchangers. Two of the papers treat noise level as influenced by geometry and flow parameters. One brief paper presents data and a simplified analysis for the effect of condensation and frosting in an air-cooled exchanger.

Shah and Webb present an excellent survey of various compact surfaces. This is followed by multistream exchangers, flow distribution in plate exchangers, equipment in cryogenic applications, and a discussion of ceramic heat exchangers.

Two papers address fluidized bed heat exchangers but not in great depth.

Two papers cover regeneration, heat storage units, and heat storage exchangers.

Four papers on design cover, in detail, problems in shell-and-tube exchangers, a discussion of various exchanger types used in coal conversion, and a new energy-cost diagram for optimization.

There are eight papers each on exchangers in power generation systems and on fouling in heat exchangers. Each group begins with an excellent survey paper. The power generation series includes discussions of various heat transfer apparatus in nuclear power plants including once-through and natural circulation U-tube boilers, and direct-contact exchangers in large steam turbine systems. There is also an excellent discussion of condenser tube failures and of reliability and efficiency of power plant exchangers.

The series on fouling discusses the mechanism of the various kinds of fouling followed by specific problems of suspended particle deposition, fouling in crude oil exchangers, and fouling from hard water. A paper on plate exchangers suggests design and operation changes to reduce fouling. Another paper based on pilot plant data shows the reduction of fouling problems in fluidized bed exchangers over conventional ones.

This 979-page collection concludes with five papers on enhancement devices. The first of these optimizes laminar flow exchanger design for internally finned tubes for four optimization cases. Generally, optimum exchangers result from using a small number of long fins. Another paper discusses the errors in using one-dimensional fin calculations and shows when two-dimensional calculations must be used. Two papers present data for swirling turbulent flow in tubes; one uses swirl vanes at the inlet and the other uses internal spiral flutes. The final paper presents data for the enhancement from internal mixing elements particularly for very viscous liquids.

The volume contains an excellent variety of problems in various kinds of heat exchangers and should be of great interest to exchanger designers and users.

Warren M. Rohsenow received a BS in mechanical engineering from Northwestern University and an MS in mechanical engineering and a PhD in engineering from Yale University. He has been a professor in mechanical engineering at the Massachusetts Institute of Technology since 1946 and is director of the Heat Transfer Laboratory. He has authored or coauthored over 100 technical journal papers and 3 books including the Handbook of Heat Transfer. *These papers cover many topics in boiling, condensation, contact resistance, and heat exchangers generally applied to steam, nuclear, and gas turbine power plants. He is a fellow of the National Academy of Engineering and recipient of the Max Jakob Award of the American Society of Mechanical Engineers–American Institute of Chemical Engineers.*