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.

Heat and Mass Transfer in Rotating Machinery

Editor Darryl F. Metzger and Naim H. Afgan

Publisher Hemisphere Publishing Corp., New York (1984)

Pages 713

Price $74.50

Reviewer Thomas R. Rehm

This is the compendium of papers presented at the XIV Symposium of the International Centre for Heat and Mass Transfer held in September, 1982 in Dubrovnik, Yugoslavia.

Topics covered include rotating tubes and channels, rotating surfaces and enclosures, experimental techniques, gas turbines, steam turbines, and rotating heat pipes and thermosyphons.

All of the papers are highly technical, utilizing high-level mathematical relations in many instances. Comparisons are made for new work with previous data, often leading to new insights in the field.

The contents would be of primary use to the advanced researcher in the field. The beginner would be overwhelmed.

Thomas R. Rehm, professor of chemical engineering at the University of Arizona, Tucson, taught chemical engineering from 1960 to 1966 at the University of Denver and at the University of Arizona since 1966. His teaching areas are in the plant and equipment design, mass transfer, and material and energy balance fields. He has also spent 20 years in the supervision of research and teaching laboratory operations along with equipment specification, purchase, and maintenance. His research fields are in computer-aided design and optimization, mass transfer, and process control.

Dr. Rehm's industrial experience has been in process development and equipment design with Universal Oil Products, Chevron Research and the Monsanto Company. He is a current or former member/chairman of three national committees of the American Institute of Chemical Engineers.

Heat Transfer 1986, Volumes 1–6

Editors C. L. Tien, V. P. Carey, and J. K. Ferrell

Publisher Hemisphere Publishing Corp., New York (1986)

Pages 3153

Price $585.00

Reviewer Clifford J. Cremers

The Eighth International Heat Transfer Conference, organized by a committee with representatives from 12 countries, was held in San Francisco, California, in August 1986. It was a grand event with over 1500 participants, of whom 1051 were authors of 450 technical papers presented in poster sessions and 28 were authors of keynote papers. The proceedings of the conference, *Heat Transfer 1986*, is a 6-volume set of 3153 pages representing a rich collection of current heat transfer research from many countries.

The first volume starts with two plenary papers and continues with all the keynote papers. E. R. G. Eckert, University of Minnesota, presents a history of the International Heat Transfer Conferences beginning with the first in London in 1951, followed by the second in Boulder, Colorado, in 1961, the third in Chicago, Illlinois, in 1966, and every four years since in Paris, Tokyo, Toronto, and Munich, respectively. The next two are scheduled for Jerusalem in 1990 and the USSR in 1994. The second plenary paper marked the 300th anniversary of the birth of Daniel Gabriel Fahrenheit with a paper entitled "Fahrenheit, A Pioneer of

Exact Thermometry" presented by Ulrich Grigull, Technische Universität München.

There is one keynote paper of special interest to engineers in the nuclear field: "Some Thermohydraulic Problems Associated with the Safety of Water Cooled Nuclear Reactors" by Hugh C. Simpson, University of Strathclyde, Glasgow. He discusses issues raised at the 440-day inquiry into the proposed construction of a Westinghouse-type pressurized water reactor at Sizewell on the southeast coast of England. About 130 days were spent on safety considerations with a substantial proportion dealing with thermohydraulic problems associated with loss-of-coolant accidents (LOCAs). He focuses on the "evaluation model" approach to computer modeling and the "best estimate" codes. For the former, he finds that assumptions previously believed to have been conservative may be shown not to have been so upon examination of existing data. Further, the method does not lend itself to direct comparison with experiment. For the latter he shows that care must be taken not to oversimplify the models of complex thermohydraulic phenomena. Readers may also find material related to thermohydraulics in keynote papers concerning heat exchangers, buoyancy-influenced flows, boiling, and two-phase flows.

One of the 20 chapters in the remaining 5 volumes is entitled "Nuclear Reactor Heat Transfer." Of 23 papers, 13 deal in one way or another with LOCAs; 3 are on subchannel flow analyses or problems; 5 concern liquid-metal reactors; 1 is on condenser analysis, and 1 is on performance degradation by deposit formation on the gas side of boiler tubes in a carbon dioxide cooled reactor. Of the remaining chapters, those on interfacial phenomena, pool boiling, flow boiling, two-phase flow, heat exchangers, heat transfer augmentation, natural and mixed convection, and internal forced convection may be also of interest to readers of *Nuclear Technology*. These contain 176 papers among them, more material than one would usually find at many specialists' technical conferences.

The Assembly for International Heat Transfer Conferences has attempted to keep a geographical balance among the conference papers. Maximum limits on the number that may be accepted from each of the countries with major research activities are negotiated for each conference. This tends to keep paper quality high for countries with high levels of research activity that usually have paper submission levels in considerable excess of the respective limits. However, quality is somewhat spotty where such pressures are not great. In the opinions of most, that price is not too much to pay for maintaining a large and diverse international participation.

The publisher's price of $585 will keep most individuals from purchasing these proceedings. However, as the over 1500 conference participants have sets and many technical libraries will purchase them, most engineers in the field should have the opportunity to gain access to the work. The effort in doing so will be most worthwhile.

Clifford J. Cremers is a professor in the Department of Mechanical Engineering at the University of Kentucky, where he has been since 1966. After receiving a PhD from the University of Minnesota in 1964, he was on the faculty at the Georgia Institute of Technology. He teaches courses across the spectrum of the thermal sciences and has published over 60 papers, mostly on heat transfer in plasma systems and frost layers and on thermophysical property measurement. He is a fellow of the American Society of Mechanical Engineers and has served on the Executive Committee of the Heat Transfer Division of that society, holding the office of chairman in 1984–85.

Chernobyl and Nuclear Power in USSR

Author	David R. Marples
Publisher	St. Martin's Press, Inc., New York (1986)
Pages	228
Price	$35.00 hardcover ($14.95 softcover)
Reviewer	Ihor O. Bohachevsky

The explosion at the nuclear power plant in Chernobyl, USSR, on April 26, 1986, is a quintessential illustration of consequences to be expected when political, sociological, or financial considerations are allowed to prevail over technical requirements and constraints. Such misplacements of priorities are not limited to the area of nuclear energy or to totalitarian government systems but occur in all societies that are highly developed politically, economically, technologically, and sociologically.

There are many examples; in open societies they are publicized more readily than in closed societies where news dissemination is restricted. For economic, practical, and aesthetic reasons, the original roof design of a sports arena was modified many times to the extent that the original engineering stress analysis was rendered invalid. Because of pressure to complete construction on time and within budget, the general manager did not authorize a new stress analysis. Consequently, the roof collapsed under the weight of snow; fortunately the arena was unoccupied.

A wide-body jetliner was designed in such a way that the floor of the passenger cabin could buckle when the integrity of the baggage compartment was compromised in flight (for example, by accidental door opening). Because much capital had been invested in the production facilities, the engineering memorandum pointing out this deficiency was suppressed by corporate management and the author was warned not to mention the fact publicly under penalty of severe reprisals including dismissal. The design deficiency was corrected after two crashes resulted in losses of ~600 lives.

Through an oversight, the construction of an aerial walkway in the lobby of a hotel did not follow engineering design drawings. Instead of rebuilding correctly, the construction manager ordered a quick and inexpensive modification. The completed walkway collapsed when loaded with nearly 200 occupants, resulting in many injuries and deaths.

Finally, as has been so amply publicized, the solid rocket booster of the space shuttle *Challenger* exploded when launched against recommendations of the engineering staff of the rocket manufacturer.

The technical report released by the Soviet government in August 1986 and presented to the International Atomic Energy Agency (IAEA) in Vienna describes and analyzes the accident at Chernobyl reactor No. 4. The analysis clearly shows that the explosion resulted from deliberate violations of at least six operating rules and because of manual disablement of several automatic interlocks designed and installed to prevent such accidents. Consequently, the event may be