the additional opening of crack during loading), and the *J* integral (a method of integrating a mathematical function describing stress-strain outside the elastic region from one side of the crack to the other over certain pathways). Examples of fracture are given for various materials including steels, wood, and concrete. The influence of temperature on fracture processes (flow stress) is given for a wide variety of materials including polyethylene, rocks, glass, aluminum, diamond, and Fe-Ni-Cr alloys, which are extremely useful in obtaining an overall perspective. While the paper by McLean discusses fatigue, it is lamentable that only one paragraph is devoted to finite element analysis of fracture.

Laws' chapter on the "Elastic Response of Composite Materials" is a tutorial exercise by the author containing many problems, which are intended to extend the discussion of how to calculate and predict moduli. This chapter would be most useful to students taking a course in elasticity of solids at the advanced undergraduate level. The practitioner in the field would find the tabulation of various formulas useful.

Finally, the last chapter in Vol. I is a brief description of the "Thermoviscoelastic Effect" by Caglioti and Bottani in which lattice dynamics are used as the framework for the theory to interpret results. A comparison of measured values of Gruneisen parameter with other published values is presented for various solids (aluminum, copper, titanium, and a SiCr steel and alpha brass) and agreement with other data is fair.

Volume II

The first part of the second volume of this series contains papers on the structure and cohesion of transition metals and alloys, magnetism and rare-earth alloys, and superconducting materials. The chapter on superconductors is a lecture on the nature and characteristics of the superconducting state; it contains no references and is of limited use to designers of superconducting magnets.

The bulk of Vol. II is concerned with the electronic description of semiconductor materials in both the amorphous and crystalline state including magnetic semiconductors, basic theory of operation and construction of semiconductor devices [e.g., metal oxide semiconductor (MOS)], impact avalanche transit time diodes (IMPATT diodes), integrated circuit constituents [e.g., the insulated-gate field-effect transistor (IGFET device)], optoelectronic materials and devices as used for example in Kerr cells, solid state lasers, modulation, and switches. The paper by Kostadinov on the theory of disordered materials is useful in understanding the behavior of amorphous semiconductors, and glasses. The volume ends with papers on a symposium on classical fluids in honor of Prof. Ivar Waller. This includes papers on optical and neutron scattering by liquids, theory of the structure of simple liquids, and the properties of liquids in the form of molten salts.

Overall, Vol. I appears to be extremely useful and a valuable textbook addition to those researchers and teachers having a main interest in nuclear fusion and fission reactor materials systems. While Vol. II is of limited usefulness to nuclear materials researchers, it probably would be welcomed by research workers and students who are involved in electronic device work and require an understanding of what makes electronic devices work.

The two volumes would be an excellent addition to any library serving the broad range of disciplines mentioned above.

John C. Corelli is professor and executive officer in the Department of Nuclear Engineering at Rensselaer Polytechnic Institute with major responsibility being the curriculum at the bachelor and master levels. His main research interests are fusion-reactor-simulated radiation effects in ceramic materials SiC, Si_3N_4, etc. and their implication in first wall design, radiation alteration of polymer materials, neutron and ion radiation effects in silicon, and its implication for the operation of devices and circuits.

Nuclear Disaster in the Urals

Author Zhores A. Medvedev

Publisher Random House, New York (1980)

Pages 214

Price $2.95

Reviewer Dennis D. Patton

In the winter of 1957-58 there was a devastating accident involving a major Soviet military nuclear facility. Buried nuclear waste generated an uncontrolled reaction that liberated hundreds of thousands of curies of fission products, rendering an area of over 1000 km^2 uninhabitable. Several hundred people were killed and thousands were evacuated and hospitalized. A highly developed industrial region had to be deserted because of high radiation levels. The extent of the contamination is underlined by the fact that many sizable communities listed on earlier maps were completely deleted in later versions. Highway travel through this area is still strictly controlled, and entry into some areas is forbidden. News of this disaster was suppressed by the Soviets from the beginning, and the accident remained unknown to many Westerners for years.

Nuclear Disaster in the Urals is a remarkable work by Z. A. Medvedev, a former Soviet biologist who was working in the Soviet Union at the time of the disaster. Medvedev reviewed scientific articles written by Soviet biologists, physicists, and others who went into the devastated area studying the effects of the contamination on trees, plants, insects, and wildlife. By analyzing the reports, the author was able to piece together the magnitude of the uncontrolled release, which left lakes and land areas highly radioactive even years afterward. The book is an exciting piece of scientific detective work. Medvedev gives the reader a remarkable insight into the Soviet scientific community and its dealings with the Soviet government. It is a fascinating picture of the conflict between the natural curiosity of the Soviet scientists, eager to learn what was to be learned from this unprecedented catastrophe, and the rigid determination of the Soviet government officials that the catastrophe be kept an official secret. By interpreting not only what the Soviet scientists wrote, but what they obviously falsified or left out (or what was deleted by officials), Medvedev makes a very convincing argument that stored radioactive waste in a densely populated industrial region in the southeastern Urals somehow sustained an uncontrolled explosion or violent release of a large amount of fission products that contaminated the region, making it uninhabitable not only for people but for wildlife as well. The author is familiar with many of the Soviet writers, having worked with them, and the Russian scientific literature is an easy resource for him. He is able to bring to the Western scientist a depth of understanding and a grasp of the social and political factors that few other writers could offer.

Nor does the author confine his point to the Soviet Union. He goes on to describe the general treatment of radioactive waste in U.S. nuclear military facilities, and cautions that under certain conditions an accidental uncontrolled release of fission products might occur. Medvedev speculates on how an explosion of stored radioactive waste might take place, specifically in waste stored near Hanford, Washington.

There is much to be learned from this book. It is well organized, containing adequate references, supporting documents, a glossary, and an index. It should be recommended reading for anyone concerned with high-level radioactive waste handling or disposal, but would easily stand on its own merits as a fascinating and convincing scientific detective story.

Dennis D. Patton is a native of San Francisco, California. He received his AB in physics at the University of California at Berkeley in 1953, and his MD from the University of California at Los Angeles in 1959. Following a 1-yr internship, he was in private practice in Santa Monica from 1960 to 1965. Following a residency in radiology, he was certified by the American Board of Radiology in 1968 and by the American Board of Nuclear Medicine in 1972. He served as assistant professor of radiology and director of nuclear medicine at the University of California at Irvine from 1968 to 1970; associate professor of radiology and clinical director of nuclear medicine at Vanderbilt University from 1970 to 1975; and professor of radiology and director of the division of nuclear medicine, University of Arizona, from 1975 to the present. His research interests include the evaluation of novel imaging techniques in nuclear medicine, the measurement of cerebral blood flow using tracer techniques, and clinical decision analysis.

Two-Phase Flow and Heat Transfer in the Power and Process Industries

Authors	A. E. Bergles, J. G. Collier, J. M. Delhaye, G. F. Hewitt, and F. Mayinger
Publisher	Hemisphere Publishing Corporation, New York (1981)
Pages	707
Price	$55.00
Reviewer	Gary A. Pertmer

Two Phase Flow and Heat Transfer in the Power and Process Industries is a very fine two-phase flow text. The book is a series of lecture notes that the authors prepared for two-phase flow short courses presented in 1978 and 1980. All of the authors are well known in the two-phase field, and their expertise is evident throughout.

The book is very well organized and the layout of the chapters follows in a logical, orderly progression. The book begins with chapters describing, in general, two-phase flow patterns and basic equations. From there, the following chapters include, among others, two-phase heat transfer, pool boiling, post-dryout heat transfer, and condensation. The important subjects of scaling and modeling laws and instrumentation are each covered in separate chapters. The last few chapters in the text discuss specific two-phase flow analyses and problems in the process and power industries, as well as brief introductions to nuclear plant and chemical plant safety. The final chapter in the book is an historical overview of two-phase flow and heat transfer work from 1756 to the present.

This text is very complete, in that it discusses most, if not all, of the aspects of two-phase flow and heat transfer, starting from the fundamental equations and proceeding to actual design problems. The authors present the material in a clear and concise fashion. In addition, the authors have used much of the published literature (books, papers, etc.) in the field in their discussions, and there are extensive reference lists at the end of each chapter. These reference lists may be of great benefit to a reader who has need for more detailed information on a specific subject.

There are only minor drawbacks to the book, drawbacks which are typical of multi-author texts that are mainly collections of technical lectures. Each chapter is written by one of the five authors, each of whom has a different style of writing and presenting information such as equations and figures. This results in a lack of continuity in places. As noted, however, this is not a very severe drawback.

This text should appeal to both experimental and theoretical researchers working in the general area of two-phase flow and heat transfer. Also, it should interest practicing engineers faced with two-phase analyses and problems. Much of present nuclear reactor safety research and engineering deals with two-phase flow, and this book would be of value in these research programs. The book could also possibly serve as the core text in a graduate two-phase flow course or a graduate reactor safety course. It certainly would be a highly recommended reference in such courses.

In conclusion, this book seems to be a worthwhile addition to, as the authors put it, "the continued exponential growth of literature on this subject." It is a clear, complete text that covers the subject matter very well and, as such, should be of use to engineers and scientists in the two-phase flow and heat transfer fields.

Gary A. Pertmer (BS, aerospace engineering, Iowa State University, 1971; MS, 1973, and PhD, 1978, nuclear engineering, University of Missouri-Columbia) is an assistant professor in the Nuclear Engineering Program at the University of Maryland. His research interests include reactor thermal hydraulics and safety analysis, fluid flow and heat transfer, and reactor design analysis. Currently, he is involved with two-phase flow studies utilizing a laser flow measurement system.