the LMFBR and of fusion reactors. For the last five years he directed MIT's fusion safety methodology development effort, part of which is LITFIRE, a computer code for modeling lithium fires in fusion reactors.

Fusion Research

Author	T. J. Dolan
Publisher	Pergamon Press, Elmsford, New York (1982)
Pages	855 (3 volumes)
Price	$120.00 hardcover, $75.00 paperback
Reviewer	Edward C. Morse

The purpose of this book is to describe the methods of fusion research currently in use and to describe the prospects for fusion power that may lie ahead. The book is written in textbook style in that there are problem sets, an answer key, and references for further study of the topical areas. The preface also suggests that the book is useful to workers in the field as well. The book is divided into three sections. The first is a physics section, the second is a description of current experiments, and the third is a look at the technology of proposed reactor schemes. All three contain an overwhelming amount of material, and the book has a "one of everything" style similar to the classic Glasstone texts in nuclear engineering.

The first volume of the book, titled "Principles," assumes no background other than freshman calculus and physics and ends with a fairly sophisticated overview of plasma diagnostic techniques to be applied to the tokamak fusion test reactor. I doubt whether a naive reader could really go from the right-hand rule through plasma turbulence in a little over 250 pages, but the intentions are certainly honest, and the references are good.

Included in the first volume are a brief overview of the world energy situation, a discussion of distribution functions and nuclear reactions, and some atomic and molecular physics. From there the author derives a power balance equation for a fusion reactor. After the reader sees the motivation for high values of the confinement parameter $n\tau_E$, the basic physics of plasma is introduced, with both microscopic and macroscopic viewpoints discussed. The emphasis in this physics section is on experimental as well as theoretical issues, with a strong chapter on plasma diagnostics.

The second volume, containing descriptions of all fusion experiments, past and present, is a compilation of hundreds of laboratory reports and journal articles. Some forty-odd experiments are described in varying detail. Almost no editorial viewpoint is present, either by comments on the relative merits of the various concepts presented or by selective coverage. The approach is to give as much information as has been documented in each area of experimental fusion research. This second volume is more suited as a reference book than as a text.

While the information contained in this volume is as up-to-date as possible, a treatment of this kind always runs the risk of being out-of-date quickly in the fast-paced world of experimental fusion research. However, one can read the older Glasstone and Lovberg book (first published in 1960) and still learn from the experimental evidence of the day. In that respect, the experimental chapter is a good chronicle of the 22 years of experimental progress since Glasstone and Lovberg.

The fusion technology section of this text, presented in the third volume, is a fairly general discussion of the various high-technology endeavors that are necessary in fusion systems: superconducting magnet coils, vacuum systems, radiation shielding, and exotic materials problems. The calculations discussed are a potpourri of nuclear, mechanical, and electrical design problems. Similar in style to Volume 1, the approach is to assume no background in strength of materials, neutronics, thermodynamics, or heat transfer. While some areas are covered in laborious detail, such as coil design and blanket neutronics, other areas are a bit sparse of fundamental information, such as the section on reactor materials problems due to neutron irradiation. If used as a text, one would want supplemental material in this area. In keeping with the general style of the book, however, there are ample references to the literature of this very important field.

On the whole, the book is interesting, well balanced, and organized. It is expensive compared to other texts. A student asked to purchase a course text for $75.00 will understandably balk. However, when one considers that the material contained is enough for a course in plasma physics and fusion technology, as well as an introduction to fusion research, perhaps this is not a high price for an integrated program of study in fusion. I commend Prof. Dolan in his brave attempt to document the entire nebulous and eclectic field of fusion research, even though it took three volumes.

Edward C. Morse (BS, electrical engineering, 1975, and PhD, nuclear engineering, 1979, University of Illinois, Urbana-Champaign) has studied the stability of the field-reversed mirror. He was a National Science Foundation fellow from 1975 to 1978. Dr. Morse joined the faculty of the University of California at Berkeley in 1979 as an assistant professor in the Nuclear Engineering Department. He had the distinction of being the youngest faculty member in the engineering college. He is now involved in the studies of plasma physics aimed at fusion devices, with areas of interest in particle simulation, radio-frequency (rf) interaction in plasmas, and rf driver technology.

World Survey of Major Activities in Controlled Fusion Research
(4th Edition)

Editor	Dorianna Twersky
Publisher	International Atomic Energy Agency, Vienna, Austria (1982)
Pages	429
Price	$49.00
Reviewer	Chan K. Choi

The present edition of the "World Survey" has been long awaited. Three previous editions were published in

June 1970, August 1973, and September 1976, respectively. Unlike the previous 6- X 9-in.-sized books, this current edition is $8\frac{1}{2}$ X 11 in. and has undergone substantial changes in both its scope and its format. The scope has been expanded to reflect the recent widespread and rapid progress in fusion research, including technological aspects of fusion reactor studies. The format has been radically altered from the laboratory-by-laboratory, page-by-page narration on fusion facilities to that of a directory and a reference guide in which all technical data are tabulated. The word "facilities" in the traditional title has been replaced by "activities" in accord with the broadened contents; the word "major" has still been kept although an effort was made to include as much relevant information as possible. All in all, 189 laboratories from 33 member states and 2 international organizations [European Atomic Energy Community and International Atomic Energy Agency (IAEA)] appear in this edition. This is quite an expansion in the controlled thermonuclear fusion research activities around the world; in 1970, only 14 countries appeared in the "World Survey," followed by 17 countries in 1973, and by 22 countries and 2 international organizations in 1976.

The present survey represents very thorough and extensive research done by the IAEA staff; the detailed compilation is consistent with the purpose of this survey, which is to provide a broad and current outline of the research in controlled thermonuclear fusion. The survey consists of six parts. Part A contains information on each laboratory's organization and scientific staff, listed by divisions, groups, projects, and identified by functions (directors, leaders, principal scientists, etc.). Each entry starts with the exact mailing address, telephone, and telex numbers and ends with references to the parts and sections in which the laboratory's activities appear (e.g., B la, C 12). The central four parts, B through E (Magnetic Confinement, Reactor-Oriented Technology, Inertial Confinement, and Theory and Computational Studies), are subdivided into 39 sections, corresponding to 39 subject categories. In parts B through E, each activity is shown against the laboratory "nickname" and the key staff assigned to the task.

The last part, F, the Personnel Index, lists ~6000 names, each identified by country, laboratory, and cross-reference to the text. It is interesting to note that in the 1976 edition ~3500 names appeared in the Index.

A summary of the table references to activities (table codes) versus the laboratories' nicknames and abbreviations, as used throughout the book, can be found on the two inside covers.

For the most part, the materials included in the present survey are up-to-date, and provide a fairly complete picture of the current worldwide fusion efforts. "This document will prove very useful not only to the insiders of the international fusion community but to many other people, including those from general science, administration, policy-making organizations and industry" as Mrs. D. Twersky, Editor of *Nuclear Fusion*, puts it.

About the Corrigendum and a personal comment:

1. On p. 154: The correct position of E. P. Velikhov is Deputy Director of I. V. Kurchatov Institute of Atomic Energy and *not* Deputy Director of Plasma Physics Department.

2. On p. 219: "Key Personnel" column, line 3 from top: read Oertel, M.

3. Characters appearing on pp. 69 and 80 are *not* Japanese but instead they are genuine Chinese. The pronunciation illustrated on p. 80, of course, is a Japanese adaptation of the original Chinese.

A few cartoons inserted in the text certainly make the reading more pleasant.

Chan K. Choi is an assistant professor of nuclear engineering and the assistant director of the Fusion Studies Laboratory at the University of Illinois, Urbana-Champaign. He devotes much of his research efforts to theoretical and computational fusion plasma engineering including studies of charged-particle slowing down in fusion plasmas and the A-FLINT target studies of the advanced fuel inertial confinement fusion. He has edited two important conference proceedings on the advanced fuel fusion (1977) and on the fusion engineering symposium (1981), and published more than 90 articles and technical reports.