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.

Particle Accelerators—Applications in Technology and Research

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Translator Oskar A. Chomick

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Pages 650 (illustrated)

Reviewer William B. Herrmannsfeldt

The emphasis of this book is on the first part of the subtitle, "Applications in Technology." The cover illustration of a polymer processing facility correctly forecasts the emphasis on industrial applications. The experienced accelerator professional will be surprised at the broad range of industrial uses for accelerators.

The text is adequately illustrated with graphics that, for the most part, appear to have been taken from published reports. References are extensive, although in such a large field, it is probable that someone well versed in a subspecialty would find significant gaps.

From the standpoint of energy applications, the reader of *Fusion Technology* may be disappointed in the introduction to light or heavy ion fusion, in the section "Accelerator Inertial Fusion." The references may be the best part of this treatment. The subject of neutral beam heating of magnetically confined plasmas is totally missing from this text.

Two other energy topics are covered: breeding of fissile fuel and materials studies with accelerators. Since nuclear fuel breeding using accelerators is an industry whose time is yet to come, it is not surprising that the reports referenced date from the years when it was generally thought that the growth of nuclear power production would rapidly deplete available sources of uranium. The same is true of reports of accelerators applied to radiation damage since both the downturn of the fission reactor business and the cancellation of the Fusion Material Irradiation Test facility have stretched the time scale of this area of accelerator applications.

The most complete treatment in this book is given to the field of radiochemical accelerator techniques, in a chapter of the same name. The broad treatment given this subject would make it an excellent introduction for any new worker in the field. There are good discussions and graphs for shielding, penetration, and dose. Aspects of this subject covered include the accelerator systems, the processing machinery, and costs relative to other technologies. The book also contains a very detailed discussion of ion implantation techniques and applications. This technology has been applied to harden metals such as cylinders for automobile engines. A related, but less demanding application, is using proton activation of the surface for wear analysis. There is a photograph in the text of a facility in Poland that handles this type of activation.

The first, and longest, chapter of the book is a review of all the different types of accelerators and their applications. The rest of the chapters expand on the details of Chap. I, with the result that the reader must skip back and forth between chapters to find all the information given on any one subject. Chapter II, "Accelerator Facilities," is a very brief treatment of big topics such as facility design, dosimetry, shielding, control, safety, and economics. Chapter III, "Fundamentals of Accelerator Techniques," is in fact about radiation, polymerization, cross linking, dosimetry, range of charged particles, and planning of processing facilities. These are different kinds of "fundamentals" than accelerator scientists are likely to think about but may be very fundamental to an industrial engineer.

This book could be a valuable source reference for a scientist or engineer interested in one of the specialized fields that are covered in depth. For other specialties, especially for fusion applications, the references may be the best part of the treatment.

William B. Herrmannsfeldt (PhD, physics, University of Illinois, 1958) has worked in accelerator physics at the Stanford Linear Accelerator Center since 1962. He is active in heavy ion fusion accelerator research and was chairman of the steering committee for the heavy ion fusion systems assessment program. His special interests include high intensity beam transport issues and the numerical simulation of accelerator components.