

Overview

Over the past two decades, important advances have been made in neutron and gamma ray physics and dosimetry, advances that have generated new analysis and measurement techniques, lessened uncertainties, and produced standards for international use. Most of this has been done in support of reactor development programs and the enhanced understanding of radiation damage to reactor fuels, materials, and components. An important contribution to these activities has been a series of very successful biannual symposia which have brought together leading experts from around the world, resulting in, among other things, a number of highly productive joint research projects.

This ASTM Special Technical Publication is a compilation of peer-reviewed papers presented at the most recent of these symposia, held in Jackson Hole, Wyoming, from 31 May to 5 June 1987. Most of the authors were invited to cover a specific topic by the ASTM and Euratom program committees; therefore this volume provides a particularly comprehensive state-of-the-art review of the subject by leading worldwide experts in the field.

The first ASTM-Euratom symposium, which took place in 1975 at the Joint Research Centre, Petten, The Netherlands, generally defined the status of neutron dosimetry and damage analysis programs and identified the needs of the emerging nuclear industry. The second symposium, hosted in 1977 by the Electric Power Research Institute, Palo Alto, California, emphasized data and techniques used to characterize neutron and gamma ray environments, including the use of well-characterized benchmark fields. The third meeting, which took place in 1979 at the Joint Research Centre, Ispra, Italy, focused on the interactions between materials experts and dosimetry metrologists. The thrust of the next two symposia, which were held at the National Bureau of Standards, Washington, D.C., in 1982, and at the GKSS Research Centre, Geesthacht, Federal Republic of Germany, in 1984, was radiation metrology techniques, data bases, damage correlation analyses, and standardization. However, more and more of the papers and discussions were concerned with reactor pressure vessel surveillance techniques and correlations of the resulting data, reflecting a progression from test reactor research to applications in a maturing power reactor industry.

The sixth symposium, the proceedings of which are presented herein, was designed to provide an update of the whole field of reactor physics and dosimetry. Experts were invited to cover their latest physics and dosimetry methods and to discuss applications, both in formal presentations and in organized workshop meetings. Benchmarking to standardize physics, dosimetry, and materials data was a major topic. Again, there was much interest in light water reactor pressure vessel surveillance work. Several papers reported the results of multi-nation joint research projects designed to improve the accuracy of pressure vessel dosimetry and material property trend curves by performing interrelated experiments in a number of well-characterized neutron fields.

The subjects of the papers in this volume range from neutron and gamma ray physics and dosimetry in thermal, breeder, and fusion environments to codes development and damage analyses. These topics have been arranged into eleven sections, followed by summaries of the results of the nine workshop meetings.

One of the results of the symposium was the growing awareness that accurate physics and dosimetry and reduced uncertainty limits for exposure parameters are highly important aspects of any reactor plant life extension (PLEX) effort. That is, a good assessment of the end-of-life condition of a material depends on a good assessment of the radiation field. Various ways that the reactor dosimetry community can contribute in the PLEX area are expected to be a major thrust of the Seventh ASTM-Euratom Symposium on Reactor Dosimetry, which will be held in Strasbourg, France, on 27–31 August 1990.

The symposium was organized jointly by program committees of ASTM Subcommittee E10.05 and Euratom, whose members' names are given in Appendix I. The symposium was held at the Snow King Resort in Jackson, Wyoming, and was attended by 97 individuals, 42 of whom were from 15 overseas countries. Their names and addresses are given in Appendix II.

We would like to take this opportunity to thank the attendees and the members of both organizing committees, all of whom made the symposium a scientific and social success. We would also like to acknowledge the help of the ASTM staff in organizing this book and for interacting with the authors and reviewers during the long paper review process.

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