American National Standard

WITHDRAWN

nuclear data sets for reactor design calculations

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American National Standard Nuclear Data Sets for Reactor Design Calculations

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Abstract

This standard presents specifications for the preparation of nuclear data sets for use in nuclear reactors. The present state-of-the-art precludes the recommendation of specific data sets as standard data sets at this time. However, a Standard Supergroup Structure is presented along with the preparation specifications.

American National Standard

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Foreword

(This Foreword is not a part of American National Standard Nuclear Data Sets for Reactor Design Calculations, N411-1975/ANS-19.1)

It is the intent of this American National Standard to present specifications for the preparation of nuclear data sets for use in reactor physics computer programs employed in the design of nuclear reactors and to specify certain data sets as standards. The nuclear data used in reactor design calculations are fundamental physical quantities and, hence, are independent of reactor type. The lack of complete, exact experimental measurements requires the use of evaluated estimates of the data. This standard specifies guidelines for such evaluations and specifies how the resulting data sets should be processed, tested, validated, and documented.

This standard is intended primarily for nuclear data used for reactor core calculations. However, it may be of use in shielding calculations and in other areas, such as dosimetry and fusion.

The present state-of-the-art precludes the recommendation of a single nuclear data set for all applications. It is recognized, however, that the ENDF/B system meets the procedural requirements stated in this standard and, hence, endorsement is given to that system. The ENDF/B-III data set approaches the requirements for a standard data set for fast reactor calculations. For thermal reactors, several multigroup data sets exist which are adequate when used with specific calculational models. The advantages of standardization can be realized in thermal reactor design if the use of a standard cross-section data set is factored in with the evolutionary changes made in these models. To achieve the desired single data set standard, additional coordinated effort is required. It is believed that the development of a single standard nuclear data set for use in calculations for all reactor types is an achievable goal and, therefore, viable procedures have been established for achieving this objective.

No specific data sets are identified here as standard data sets. The Standard Supergroup Structure has not been exhaustively tested in its entirety, although subsets of that structure have been used to design all existing reactors. The effects of the weighting function (used to produce the Averaged Data Set) on the reactor design has not been tested for all applications (e.g., shielding, fusion, etc.). The status of nuclear data is in significant evolution. Hence, it is recommended that this standard be reviewed within two years after final approval.

Suggestions for improvement of this standard will be welcome. They should be sent to the American Nuclear Society, 244 East Ogden Avenue, Hinsdale, IL 60521.

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The American National Standards Committee N17, Research Reactors, Reactor Physics and Radiation Shielding, which reviewed and approved this standard in 1974, had the following membership:

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