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FENDL/A-MCNP and FENDL/A-175G

The processed neutron activation cross-section data files of the FENDL project

by F.M. Mann et al.

Summary documentation by

S. Ganesan and A.B. Pashchenko

Abstract: This document summarises a neutron activation cross-section database in processed in two formats as generated by F. M. Mann within the project of the Fusion Evaluated Nuclear Data Library (FENDL): FENDL/PA in continuous energy format as used by the Monte Carlo neutron/photon transport code MCNP; and FENDL/PA-175G, in ASCII 175 group multigroup format as used by the transmutation code REAC*2/3. The data are available from the IAEA Nuclear Data Section online via INTERNET by FTP command.

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Note:

The IAEA-NDS-documents should not be considered as publications or reports. When a nuclear data library is sent out by the IAEA Nuclear Data Section, it will be accompanied by an IAEA-NDS-document which should give the data user all necessary information on contents, format and origin of the data library.

IAEA-NDS-documents are updated whenever there is additional information of relevance to the users of the data library.

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FENDL, the Fusion Evaluated Nuclear Data Library is produced by a cooperation organized by the IAEA Nuclear Data Section. A general introduction to the specifications, nomenclature and access to online is given in the Appendix. As part of FENDL a neutron activation cross-section data library has been established under the acronym FENDL/PA-1.1 where A stands for activation and P for "point data", i.e. any resonance parameters contained in the original data file have been converted to cross-section data. 1.1 indicates the present version.

The FENDL activation file has been further processed for input to computer calculations, in two modes:

1. Continuous energy format as used by the Monte Carlo neutron/photon transport code MCNP:

   "FENDL/PA-1.1-MCNP"

2. ASCII 175-group multigroup format as used by the transmutation code REAC*2/3:

   "FENDL/PA-1.1-175G"

These data files are indexed, together with the description of the processing, in the report:

> F.M. Mann, D.E. Lessor, L.L. Carter, "Processing of FENDL-PA/1.1", Report WHC-EP-0727, Westinghouse Hanford Company, Richland, Washington, USA, Feb. 1994.

The present database contains about 12 000 neutron activation reations for more than 600 target nuclides and isomers.

The MCNP database has a size of 96 Megabytes, i.e. 193129 blocks (1 block = 512 bytes).

The 175-group database has a size of 26 Megabytes, i.e. 52875 blocks.

The files are available from the IAEA Nuclear Data Section online through INTERNET. The file transfer via INTERNET can be performed by FTP command to the address:

IAEAND.IAEA.OR.AT or
161.5.2.2.

The user should logon with the user name "FENDL". No password is required. After having logged on the user should go to the subdirectory

"[FENDLA.MANN.MCNP]"

to obtain the MCNP compatible processed activation data.

The subdirectory

"[FENDLA.MANN.GROUP]"

provides the multigroup data in REAC format in 175 group structure.

Cross-reference

For the same database in ENDF-6 point data form see documention IAEA-NDS-148. This has also a VITAMIN J 175-group version, with the same group structure but computed at the IAEA/NDS with a flat weighting spectrum and cast in ENDF-6 histogram format, whereas FENDL/PA-175G has been generated using VITAMIN-E spectrum and is in a format as used by the transmutation code REAC*2/3.

APPENDIX

SPECIFICATIONS AND ACCESS TO ONLINE FUSION EVALUATED NUCLEAR DATA FILES:

The FENDL project of the International Atomic Energy Agency has the task of co-ordinating the assembly, processing and testing of a comprehensive, fusion-relevant Fusion Evaluated Nuclear Data Library (FENDL) with unrestricted international distribution. The FENDL project has made significant progress in 1994. Well tested and validated nuclear data libraries in processed form are intended to be ready by mid 1996 for use by the ITER team in the final phase of ITER EDA, after iterative feedback to the evaluators through extensive benchmarking and integral validation studies of FENDL-2 in 1994-1996 period.

The FENDL library is composed of several sublibraries describing the transport of both the plasma-source neutrons and secondary gamma rays through fusion reactor components, as well as the resulting radiation effects, such as nuclear heating, tritium breeding, activation and material damage. Also included are cross sections for fusion and other important charged-particle nuclear reactions of the plasma constituents, as well as data for fusion-relevant neutron dosimetry.

The FENDL files are specified as follows:

FENDL/E: Neutron reaction data for neutron/photon transport calculations in structural materials

FENDL/A: Neutron activation cross-sections

FENDL/DS: Neutron activation cross-sections for dosimetry by foil activation

FENDL/D: Decay data of activation products

FENDL/C: Charged-particle reactions

FENDL/BENCHMARKS: Compiled information on fusion neutronics benchmarks

Note that 'FENDL' represents a system of data libraries. FENDL-1 represents a system of sublibraries with the suffix '-1' denoting the first version and '-2' the second version. For the individual sublibraries again the same convention will be followed. FENDL/E-1.0 stands for the first version of FENDL/E library. The point activation library of FENDL/A is denoted by FENDL/PA-1.1 with '-1.1' indicating the version 1.1 and FENDL/PA-1.1-MCNP stands for the FENDL/PA-1.1 in format for use by the Monte Carlo code MCNP. The data library designated by FENDL/PA-1.1-175G is the multigroup library in 175 energy groups derived from FENDL/PA-1.1 for use by the transmutation code REAC*2/3.

Presently, most of the FENDL-1 files are available online from the IAEA's Nuclear Data Section. The data can be accessed by the user over international computer networks as described below. In the Nuclear Data Section open area 'FENDL', a subdirectory has been created for each file, for example, "FENDLE" for the FENDL/E file. There are 'AAREADME.TXT' files in the subdirectories providing explanatory notes.

The file transfer via internet can be performed by ftp command to the address:

iaeand.iaea.or.at or
161.5.2.2.

The user should logon with the user name "FENDL". No password is required. After having logged on, the user can enter any required subdirectory using 'cd' and transfer files as desired.

In the middle of 1994 a grand total of 46 directories with 791 "files" with a total size of 1640676 blocks (one block = 512 bytes) constituting FENDL-1 was made available online. Subsequently the FENDL/MC and FENDL/MG data libraries were revised and several additions were made to the integral benchmark database. At the end of 1994, a grand total of 47 directories with 840 "files" with a total size of 1977843 blocks is available online. Note that a large data library such as FENDL/PA was split into several "files" of a convenient size adequate for FTP transfer.