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Status Report of JAERI/NDC and JNDC

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1. JAERI/NDC Activities

Nuclear Data Center at Japan Atomic Energy Research Institute (JAERI/NDC) plays a role of Japanese nuclear data center. The international collaboration and data exchange are made basically through JAERI/NDC. JAERI/NDC serves as the secretariat of Japanese Nuclear Data Committee (JNDC)

Evaluation and compilation of Japanese Evaluated Nuclear Data Library (JENDL) is done in cooperation with (JNDC). The second revised version of JENDL-3 (JENDL-3.2) was released in June 1994. JENDL-3.2 provides the neutron induced reaction data for 340 nuclei/elements in the energy range from 10^{-5} eV to 20 MeV. Pointwise files at 0 K and 300 K are also available.

We are making several JENDL Special Purpose Files in cooperation with JNDC. Recently, we finished compilation of JENDL Fusion File and JENDL Activation Cross Section File. JENDL Fusion File contains the data for 83 nuclei/elements important for fusion neutronics. Special care was paid for double differential cross sections in the MeV region. JENDL Activation Cross Section File stores the cross section data for 225 nuclei and 1158 reactions. Work is in progress for Photoneuclear Data File, Actinoid File, PKA Spectrum File, (α, n) Reaction Data File and High Energy Files. Revision of JENDL Dosimetry File is also in progress.

The nuclear structure and decay data are evaluated under the international collaboration. Japan is in charge of the mass numbers from 118 to 129. Now the evaluation for A=120 and 124 is in progress.

JAERI/NDC has experimental activities by itself and collaborating with universities and laboratories in Japan. Measurements of nuclear data, such as activation cross sections and double differential alpha-particle emission spectrum for neutron induced reactions of structural materials, and cross sections and double differential particle emission spectra for charged particle induced reactions were performed.

Atomic and molecular data for fusion reactor applications are also evaluated and compiled. The 4-th issue of Japanese Evaluated Atomic and Molecular Data Library (JEAMDL-4) is under compilation.

We are providing a WWW server from which nuclear data users can take information on nuclear data as well as numerical data themselves such as JENDL-3.2, JENDL-3.2 pointwise file, JENDL special purpose files. This server will become open soon. Down-loading of numerical data will be available only for users in Japan for a while.

2. JNDC Activities

Japanese Nuclear Data Committee (JNDC) has about 145 members from universities, national laboratories, industries and software houses etc. as well as JAERI and Japan Atomic Energy Society. JNDC consists of three subcommittees, which are on nuclear data, on reactor constants and on fuel cycle, six standing groups, steering and counseling committees. Each

subcommittee has several working groups (WGs). Figure 1 shows the current structure of JNDC.

2.1 Subcommittee on Nuclear Data

(1) *High Energy Nuclear Data Evaluation WG*

JENDL High Energy Files are being made by this WG. The evaluation is made in two phases. In the phase-I, the data up to 50 MeV will be evaluated for neutron and proton induced reactions. Evaluation work of the phase-I is at the final stage for the neutron-induced reaction data of H, C, Cr, Fe, Ni, Be, N, O, Co, and proton-induced reaction data of C, Fe, Ni and Cu for protons. The energy range will be extended up to a few GeV in the phase-II. Phase-II has already started for Si, Cr, Ni and Cu.

(2) *Covariance Data Evaluation WG*

Methods of covariance matrix evaluation have been investigated, in particular the methods based on experimental data and on uncertainties of parameters used in theoretical calculations. A computer program KALMAN based on the uncertainties of parameters has been developed by Kawano et al. at Kyushu University. The covariance data will be provided for important reaction data of JENDL-3.2.

(3) *Evaluation and Calculation System WG*

Investigation on optical model parameters, level density parameters were made. A system for fission spectrum calculation was developed on the basis of two temperature Madland-Nix model. Integrated Nuclear Data Evaluation System (INDES) is now being developed.

(4) *Fission Product Nuclear Data WG*

Re-evaluation of nuclear data for about 60 fission products has been finished and the results were stored in JENDL-3.2. Benchmark calculation of the reevaluated data has been made. It was confirmed that the FP nuclear data in JENDL-3.2 reproduce the integral experimental data within discrepancies of 15 %.

(5) *Activation-Cross-Section Data WG*

This WG has done evaluation, compilation and benchmark tests of JENDL Activation Cross Section File. The first version of Activation Cross Section File has been completed.

(6) *PKA Spectrum WG*

A code system of ESPERANT for making PKA/KERMA files was modified. A PKA/KERMA file for 69 nuclei from F to Bi was constructed on the basis of JENDL Fusion File. This file will be used for testing of the data.

(7) *Charged Particle Nuclear Data WG*

This WG is responsible to JENDL (α, n) Reaction File. No activity was made in 1994.

(8) *Photonuclear Data WG*

Evaluation of photonuclear data for 48 nuclei has been made in the energy range below 140 MeV. The first version of JENDL Photonuclear Data file will have data for isotopes of H, C, N, O, Na, Mg, Al, Si, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Zr, Nb, Mo, Cs, Gd, Au, Ta, W, Pb, Bi and U. The compilation of the file will be completed in 1995.

2.2 Subcommittee on Reactor Constants

(1) *Reactor Integral Test WG*

Benchmark test of JENDL-3.2 for fast and thermal reactors has been made. The cross section library for use of SRAC, JOINT, MVP and VIM was created and distributed in the domestic user. Comparison between JENDL-3.2 and ENDF/B-VI will be performed in 1995.

(2) *Shielding Integral Test WG*

Integral test of JENDL-3.2 with shielding benchmarks has been made for iron, sodium and oxygen. Comparison of gamma-ray production data of iron between JENDL-3.2 and FENDL-1 was also done.

(3) *Dosimetry Integral Test WG*

Reevaluation of dosimetry reaction cross section data in JENDL Dosimetry File is in progress.

(4) *Fusion Neutronics Integral Test WG*

Integral test of JENDL-3.2 for fusion applications has been made for Li, Be, C, O, Al, Ti, Mn, Cr, Fe, Co, Cu, Nb, W, Pb. Comparison between JENDL-3.2 and FENDL-1 was also done.

(5) *Standard Group Constants WG*

No activities in the last year

2.3 Subcommittee on Fuel Cycle

The subcommittee on fuel cycle consists of two WGs. Generation of an ORIGEN-2/INDC library based on JENDL-3.2 is in progress as a joint effort of the two WGs. Other activities are as follows.

(1) *Decay Heat Evaluation WG*

Energy spectrum of the β -ray component of decay heat has been studied on the basis of Gross Theory of β -decay. Recent improvement of the theory was fully adopted and the calculated results agreed fairly well with the experiments in literatures.

(2) *WG on Evaluation of Nuclide Generation and Depletion*

Experimental data on nuclide inventories in spent fuels were collected and compiled. The results were stored in SFCOMPO data management system, which had been developed for the present purpose.

2.4 Standing Groups

(1) *CINDA Group*

Papers on neutron induced reaction data published in Japanese journals and reports are surveyed. The 104 entries were sent to the NEA Data Bank in the last one year.

(2) *ENSDF Group*

The evaluation of nuclear structure data is performed for nuclei with mass numbers from 118 to 129. Reevaluation of data for $A=120$ and 124 is in progress.

(3) *Group on Atomic, Molecular and Nuclear Data for Medical Use*

Survey work has been done for the radiopharmaceutical data needed in the field of nuclear medicine.

(4) *JENDL Compilation Group*

Compilation of JENDL-3.2 was completed. Pointwise cross section files were made at 0 k and 300 K.

(5) *Editorial Group of "Nuclear Data News"*

Three issues of "Nuclear Data News" which is a periodic informal journal in Japanese were published in a year.

Fig. 1 Structure of Japanese Nuclear Data Committee

