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INDC INTERNATIONAL NUCLEAR DATA COMMITTEE

Table of Content Translations

of

Soviet Reports received by the INDC Secretariat

Translated by the IAEA
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Foreword

The INDC Secretariat receives a number of Soviet reports in Russian as part of the INDC document distribution system. Because of their large number and size most of them cannot be translated by the IAEA. The "Nuclear Physics Research in the USSR - Collected Abstracts" report series and occasional reports of interest to the nuclear data community are translated by the IAEA on a regular basis, and are normally given a "U" distribution.

The "Table of Content Translations" contain the translation of the table of contents, and abstracts when available, of those Soviet reports which the IAEA does not translate. The originals of these reports are normally available in limited quantities only and are given an INDC "G" distribution.

This issue contains the table of content translation of the following reports:

- Nuclear Constants, Volume 24
  Original distributed as INDC(CCP)-114/G

- Nuclear Constants, Volume 25
  Original distributed as INDC(CCP)-115/G

- Nuclear Constants, Volume 26
  Original distributed as INDC(CCP)-116/G

NUCLEAR CONSTANTS, Volume 24

INDC(CCP)-114/G

Inelastic Scattering of 4,7 MeV Neutrons by Al, Mn, Fe, Ni, Cu, Pb
V.N. Dushin, et al

The inelastic scattering of the 4,7 MeV neutrons by Al, Mn, Fe, Ni, Cu, Pb was studied by the time-of-flight method. The total inelastic cross sections are given.

Yield and Spectrum of Neutrons from $^{7}Li(p,n)$ Reaction Near the Threshold
V.N. Kononov, et al

The expression for an energy distribution and yield for $^{7}Li(p,n)^{7}Be$ neutrons at various laboratory angles have been derived for the proton energies between a threshold up to 2 MeV. The results of calculation are in a good agreement with the experiment.

Absolute Fission Cross Section of Heavy Elements by Fast Neutrons
V.M. Adamov, et al

The results of the absolute cross section measurements of ^{233}U, ^{235}U, ^{238}U and ^{239}Pu fission using ^{252}Cf spectrum neutrons and 14,8 MeV neutrons are given.

The Investigation of the Fine Structure of Fragment Yields Resulting from Photofission and Fast Neutron Fission of Heavy Nuclei
K.A. Petrzhak

The relative yields of xenon isotopes resulting from fission of ^{235}U, ^{239}Pu by bremsstrahlung and ^{235}U, ^{239}Pu, ^{232}Th by 14,7 MeV neutrons are measured. Fine structure is observed for all nuclei except for ^{232}Th. The observation of fine structure at the excitation energy of a fissionable nucleus up to $\sim$ 21 MeV is discussed from the point of view of increasing contribution of the emissive fission with the excitation energy increase.

Study of ^{240}Pu Spontaneous Fission
B.G. Bassova, et al

The measurement of mass and kinetic energy distributions of fragments from ^{240}Pu isotope spontaneous fission are presented. The average total kinetic energy for fragments produced by ^{240}Pu spontaneous fission is $0,7 \pm 0,4$ MeV higher that for those resulting from ^{239}Pu thermal fission.

The Average Kinetic Energies of Fission Fragments
V.G. Vorobiova

The systematization of experimental average kinetic energy data of fragments produced from fission of nuclei by various particles has been made.

Analysis of Measurement Methods of Fast Monoenergic Neutrons with Recoil Protons Proportional Counters
A.N. Davletshin, V.A. Tolstikov

All stages of using the technique with proportional hydrogen counters for measurements of fast neutron fluxes on electrostatic accelerators (calculation and measurement of recoil proton spectra, the methods of results processing)are analysed. Main attention is paid to considering the causes of systematic error occurrence and the ways of their elimination and evaluation. In particular examples it is shown that with the counters used by the authors, it may be possible to determine, the strength of a neutron source for E_n = 350 keV with an accuracy of $\pm 1,4\%$ and for E_n = 1200 keV with $\pm 2\%$. An evaluation of systematic errors is performed.

Comparison of Experimental and Calculated Neutron Radiative Capture Data for Some Actinide Isotopes Irradiated in the BR-5 Reactor
G.N. Andriakhina, et al

A comparison between calculated and experimental data on radiative capture cross-sections of some isotopes of a number of heavy elements is given. The isotopes were irradiated in the neutron spectrum near the BR-5 reactor core center which consists of plutonium dioxide and uranium-carbide fuel. Distributions of investigated isotopes capture integrals over the reactor core height and reflector are compared with calculations.

One-dimensional (M-26) and two-dimensional computational programs were used in the diffussional P_1-approximation as well as the group constants sets BNAB-70 and OSCAR-75.

Study of the Self-shielding Effect on Neutron-matter Interaction Cross Sections in a Nuclear Reactor
Yu.A. Egorov, et al

Results of measurements of neutron transmission through thick samples of matter for the verification of the fundamental total neutron cross section data as well as for the evaluation of the average total cross section are given. Particular attention is given to the cross section resonance self-shielding effect.

Analysis of 21-Group Cross-section Sets Used in Calculations of K_{eff} and Some Reactor Parameters of Different Neutron Spectrum Assemblies
G.M. Besselova, et al

Two 21-group cross-section sets used for calculation of reactors are checked by comparison of measured and calculated K_{eff} and some reactor parameters of thermal, epithermal, intermediate and fast neutron spectrum critical assemblies. It is shown that the results of calculations using the cross-section set are in a better agreement with the experiment.

Estimate of Heterogeneous Effects Occuring in Fast Critical Assemblies
V.V. Korobeinikov, et al

The estimate of the heterogeneous effect on the critical parameters and cross section ratios for the BFS-31 fast critical assemblies are given. The accounting of the heterogeneous resonance cross section self-shielding has been carried out in a sub-group approximation using a computation of the heterogeneous resonance perturbations by the Monte-Carlo method with a correlated trajectory selection. The non-resonance heterogeneous effects have been computed by the collision probability method. The computation was performed with the ARAMAKO 26-group constant.

The Numerical Solution of the Neutron Transport Equation in Hydrogen and Water, and Evaluation of Space Dependence Effect of Group-mean Neutron Cross Sections

V.A. Sholokhova, A.P. Suvorov

The paper presents a numerical algorithm for solving integro-differential equation of neutron transport from a point isotropic source in an infinite medium, and the spatial dependence of group-mean neutron cross section is investigated.

The results of differential neutron spectra from numerical calculations for a source of monoenergetic neutrons and for a fission source are given. The values of mean-group total and partial differential cross sections obtained by averaging both over neutron flux spectrum at different distances from the source and over spectrum in different zones are given.

NUCLEAR CONSTANTS, Volume 25

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The Ranges of Fission Fragments in Different Materials

A.I. Nazarov, V.V. Frunze

Ranges of ^{235}U and ^{239}Pu fission fragments in every natural element are presented.

Analysis and Evaluation of the α Data for ^{239}Pu

V.N. Kononov, E.D. Poletaev

The experimental data for ^{239}Pu α (microscopic experiments) in the energy range 0,1-1000 keV were analysed, and the evaluated values of alpha with the covariance matrix were obtained.

Average Resonance Parameters of ^{241}Pu in the Unresolved Resonance Energy Region

G.V. Antsipov, et al

The average resonance parameters of ^{241}Pu in the unresolved resonance energy region are obtained on the basis of the average para-

meters from the data analysis in the resolved resonance energy region and the average neutron cross-sections in the unresolved resonance energy region.

The Calculation of the Slow Neutron Scattering Cross-Section by Means of Phonon Expansion Taking Into Account Coherent Effects in a Polycrystal

P.E. Bulavin

The method for calculation of zero and first angular moments of scattering cross-sections by means of phonon expansion is reported. The coherent effects in a polycrystal in one-phonon approximation are taken into account. The next members of expansion are calculated in noncoherent approximation. The calculated and measured polycrystal beryllium total scattering cross-sections are compared.

Slow Neutron Total and Capture Cross-Section of ^{56}Fe

O.A. Shcherbakov, et al

Neutron time-of-flight spectrometer with 25 MeV electron linac were used in the energy range from 0,007 eV up to 1200 eV with the energy resolution of 0,11 ms/m. The parameters of the negative level at E = -2,64 keV and the level at E = 1,153 keV were obtained.

Evaluation of Neutron Cross-Sections for Nickel Isotopes in the Energy Range of 1-15 MeV

V.M.Bychkov, V.I. Popov

The results of the evaluation of fast neutron reaction cross sections are presented. Data of the experimental works published up to 1976 year and theoretical model calculations were used in the evaluation.

Recommended values were obtained for level exitation function for neutron inelastic scattering on the isotopes of ^{58}Ni, ^{60}Ni, for cross-sections of threshold on the isotopes of nickel ^{58}Ni, ^{60}Ni, ^{62}Ni, for the angular distributions of elastically scattered neutron and for energy spectra of neutron inelastically scattered for a natural isotope mixture.

Influence of Variations in Nuclear Data of Higher Plutonium Isotopes on Physical Characteristic of Large Fast Reactor
A.I. Voropaev, et al

The evaluation is made for higher plutonium isotopes constants on the basis of new experimental data. The change of the values of breeding ratio and critical mass for the BN-1500 reactor model is compared with calculations using BNAB-70 constants.

On the Information Content of Neutron Reaction Rates Spectra in Reactor Assemblies
A.A. Van'kov, et al

The uncertainties of multigroup neutron spectrum calculations due to resonance structure of neutron cross-sections is discussed. An importance of the new experiments on neutron flux and reaction rate spectrometry in critical assemblies is outlined. The analysis of such experimental data allows to specify more precisely the elastic transfer cross-sections and other physical characteristics of a reactor medium.

Construction of the Rational Fraction Approximations of a Resonance Curve by the Pseudoinversion Method
V.N. Vinogradov, et al

A linear recurrent method is proposed for the construction of the rational fraction approximation of experimental data. The linearized problem is solved by the pseudoinversion of a rectangular matrix. The proposed algorithm allows to get the approximants with an arbitrary orders of polynomials in the numerator and in the denominator. The convergence and effectiveness of the method are investigated on model calculations.

The Probability of Detecting False Peaks in Analysing Resonance Curves
V.N. Vinogradov, et al

The probability to observe "false peaks", i.e. of the terms corresponding to complex poles in the rational approximants for experimental data is calculated. The results are checked by Monte-Carlo method. Even for large numbers of parameters, the solution remained stable. False peaks (one for every 15 points approximately) are observed to be within error limits.

Statistical Regularization Method for Unfolding Spectra
A.A. Van'kov

A critical survey of some algorithms to unfold spectra using the concept of statistical assembly is given. The method based on a consistent approach of using prior information is described.

NUCLEAR CONSTANTS, Volume 26

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On the Parametric Representation of Thermal Constants
V.N. Gurin

Simple analytic formulae for calculation of one-group thermal macroscopic constants are suggested. These formulae approximate the results of exact calculations of thermal macroconstants for bare reactors and water-reflected reactors. Homogeneous mixtures of metal uranium and water are considered. Ratio of atomic concentrations of hydrogen and uranium varies from 1 to 1500.

Total Neutron Cross Section for Uranium and Thorium in the Energy Region 10-250 keV
V.V. Filippov

Thick sample transmission of neutrons at energies from 10-250 keV were used in analysing of descrepancies between values of total cross sections for natural uranium and thorium adopted in BNL-325 and the group constant set ABBN-64. The latter seems to be favourable.

Neutron Cross Section Calculations for ^{239}Pu, ^{241}Pu, ^{243}Pu, ^{235}U, ^{237}U, ^{239}U in the Energy Region 1-150 keV
V.E. Marshalkin, V.M. Povyshov

The set of optical potential parameters have been determined on the basis of total, capture and elastic scattering cross section dependencies for ^{239}Pu in the neutron energy range from 1 to 150 keV.

Neutron cross section calculations have been made in the energy region 1-150 keV for ^{241}Pu, ^{243}Pu, ^{237}Pu, ^{239}U. Comments are made on the uncertainty of cross sections calculated.

Neutron Scattering Functions for Some Nuclear Reactions
A.S. Tjapin, V.E. Marshalkin

Expressions for the energy and angular distributions of secondary neutrons generated by elastic and inelastic interactions of neutrons with nuclei have been obtained in the framework of statistical model of nuclear reactions and careful consideration of process kinematics.

The Calculations of Nuclear Charge Distributions in the Model of Two Impending Fission Fragments
N.G. Volkov, et al

The calculated nuclear charge distributions of fission fragments are presented. A model of two impending fragments has been used. The calculated parameters of independent yield distributions are in a good agreement with the experimental results, which are obtained by the X-ray radiation method for fission fragments.

Defined Methods of the Initial Nucleon Composition of Fission Fragments and Production of Heavy Nuclei by Neutrons
N.G. Volkov, et al

The modern theoretical, experimental, empiric and semiempiric methods of determination of the independent nuclear fission fragments yields are reviewed.

On the Calculation of the Effective Temperature of Photoneutron Spectra
V.S. Stavinsky, Yu.N. Shubin

The relationship between the effective temperature of the evaporation photoneutron spectrum and the nuclear characteristics, the giant resonance parameters and the maximum bremsstrahlung energy is derived. Comparison of theory with experimental data is performed.

The Electrodisintegration Cross Section of Cu

V.P. Kovalev, V.I. Issaev, V.V. Gordeev

The electrodisintegration cross sections of copper were measured as a function of electron energy for the range 14-26 MeV by means of the stacked foil method. When the electron energy is increased, the increase of the electrodisintegration cross section is observed. This fact agrees with the photodisintegration cross section changing in the energy region above the threshold.

The Problem of Linearity Smoothing from the Informational Point of View

A.A. Shimanskij

The problem of the smoothing of the experimental dependences is considered from the point of view of information theory. The general form of the weight function is obtained. The optimization of this function is considered.