RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION CARBIDE CORPORATION • FOR THE U.S. ATOMIC ENERGY COMMISSION

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OAK RIDGE, TENNESSEE 37831

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Most ignorance is vincible ignorance.
We don't know because we don't want to know.
- Aldous Huxley

SEMINAR-WORKSHOP AT OAK RIDGE
October 1-3, 1969

Multigroup Cross Section Preparation
Theory, Techniques, and Computer Codes

A seminar-workshop, sponsored by RSIC and the Oak Ridge National Laboratory Reactor Division, will be held at ORNL October 1-3 on multigroup cross section preparation and use in transport codes.

It is expected that most of the leading laboratories in the United States will contribute to the seminar by describing their current work in this field. Those who contribute will prepare a 300-500 word summary which will be published immediately after the conference as an ORNL-RSIC state-of-the-art report.

The seminar will take 1 1/2 days. The remaining time will be spent in workshop sessions on the use of the codes SUPERTOG and XSDRN.

SUPERTOG*, an extension of the ETOG program, generates fine-group parameters and P_n scattering matrices from the ENDF/B neutron cross section library. It accepts data such as smooth cross sections, single level Breit-Wigner resonance parameters, secondary energy and angular distributions, and spectra weight functions. It generates fine-group constants such as one dimensional reaction arrays (absorption, fission, etc.), P_n elastic scattering matrices, and inelastic and (n,2n) scattering matrices. This data and applicable resonance parameters are output on tapes suitable for use with the GAM-1, GAM-II, ANISN, XSDRN, or DOT programs. The RSIC-distributed group library DLC-2 was generated by SUPERTOG.

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*R. Q. Wright, J. L. Lucius, N. M. Greene, and C. W. Craven, Jr., "SUPERTOG: A Program to Generate Fine Group Constants and P_n Scattering Matrices from ENDF/B" (ORNL-TM report to be published).

The program is written in FORTRAN IV and has been run on the IBM 360/50/65/75 and CDC 6600 machines. The present version permits up to 199 groups and P_8 elastic scattering.

XSDRN* is a discrete ordinates, spectral averaging code for the generation of nuclear multigroup constants in the fast, resonance, and thermalization energy regions. It combines the features of the one-dimensional anisotropic discrete ordinates S_n code ANISN with the Nordheim integral treatment routines from GAM-II. The program is written in FORTRAN IV and uses a variable dimensioning technique which optimizes the use of core storage.

XSDRN comprises three major algorithms. The first is a resonance calculation to provide fine-group parameters; the second is a discrete ordinates neutronics calculation to determine fine-group fluxes; and the third is a multigroup constants calculation to generate parameters for subsequent calculations in XSDRN or in other codes.

The code calculates an arbitrary number of flux moments for zero or one-dimensional systems. Several problem types are provided for, including fixed source, eigenvalue, and criticality search. Extensive cross section libraries are available which can be reduced, using calculated fine-group fluxes, to arbitrary broad-group structures. Provisions are available to produce library tapes for several codes, and modifications can be easily made to include other codes.

All prospective attendees should contact RSIC as soon as possible by mail or telephone (615-483-8611, ext. 3-6944 or FTS system 615-483-6944). Attendees will be responsible for their own travel and housing reservations. Limousine service to the Oak Ridge motels (Holiday Inn, Diplomat, and Alexander Motor Inn) is available for each flight at the Knoxville airport.

Further details will be sent to those who have expressed interest in attending.

SEMINAR AT OAK RIDGE SEPTEMBER 30, 1969

Discrete Ordinates Calculations for Two Dimensions

An RSIC-sponsored seminar on the use of two-dimensional discrete ordinates codes will be held at ORNL on September 30. Discussions and status reports will be given of various versions of DOT, such as the recently developed DOT-II code, TWO-TRAN, and probably others. Summary papers will be given in the morning and round-table discussions are seheduled for the afternoon.

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*N. M. Greene and C. W. Craven, Jr., "XSDRN: A Discrete Ordinates Spectral Averaging Code," ORNL-TM-2500 (to be published).

Prospective attendees should contact RSIC as soon as possible to facilitate detailed plans for the conference.

COUPLED NEUTRON GAMMA RAY MULTIGROUP CROSS-SECTION LIBRARY AVAILABLE FROM RSIC

The DLC-9/FARS cross-section library is now available from RSIC. It is a coupled neutron and gamma-ray multigroup library in the ANISN-DOT-DTF IV format. The library contains the elements H, C, N, O, Mg, Al, Si, Ca, and Fe and covers the energy range from 15 MeV to thermal for neutrons and from 10 to 0.02 MeV for gamma rays.

This P_8 expansion, 122 group (104 neutron, 18 gamma-ray groups) cross section library was compiled for use by F. A. R. Schmidt in a state-of-the-art review for RSIC. The report of his work, "Concrete for Shielding of Neutrons up to 14 MeV," will be published as ORNL-RSIC-26.

A discussion of the references for the data and a program for handling the data are included in the DLC-9 BCD package. Requesters should send a tape reel and specify number of tracks and bit density.

ENDF CROSS SECTION HANDLING CODES AVAILABLE FROM ARGONNE CODE CENTER

A package of computer codes useful in handling ENDF/B-formatted cross section data developed at the National Neutron Cross Section Center (NNCSC), Brookhaven National Laboratory, is available from the Argonne National Laboratory Code Center. These codes, CHECKER, CRECT, DAMMET, PLOTFB, and retrieval subroutines, can be used for a variety of purposes, such as checking for errors, revising, plotting, editing, interpolating, etc. A manual (ENDF-110) on the use of these codes is also available from the Argonne Code Center. Questions or comments on the use of ENDF/B codes should be directed to the NNCSC.

NEW PSR PACKAGES AVAILABLE

Three Peripheral Shielding Routines have been added to the list given in the January 1969 Newsletter.

PSR-7/MUG — Multigroup Photon Cross-Section Generator in the ANISN-DOT format, by J. R. Knight and F. R. Mynatt, Union Carbide Corporation, Computing Technology Center, Oak Ridge, Tenn. Available for IBM-360.

PSR-8/AUTOJOM-JOMREAD — Computer Programs to Generate or Check Coefficients for Quadratic Equations Describing Three Dimensional Geometries, by R. J. Cahill, G. C. Spitale, and J. F. Yoder, Air Force Weapons Laboratory, Kirtland Air Force Base, New Mexico. (AFWL-TR-67-60, AFWL-TR-67-36). Available for CDC-6600.

PSR-9/CSP — Neutron Cross-Section Averaging Code, by K. J. Yost and N. M. Greene, Oak Ridge National Laboratory, Oak Ridge, Tenn. (ORNL-4130) Available for IBM-360.

NEW CODE PACKAGES AVAILABLE

Operable, tested with a sample problem, and available for distribution are the following code packages:

CCC-7B/NTC — Modification and Further Development of the Nucleon Transport Code, NTC, contributed by Oak Ridge National Laboratory, Oak Ridge, Tennessee. (ORNL-TM-1866) Available for IBM-7090

CCC-103/OPEX-II — A Radiation Shield Optimization Code, contributed by NASA Lewis Research Center, Cleveland, Ohio. (NASA TM X-1769) Available for IBM 7090.

CCC-115/GADJET — Monte Carlo Gamma-Ray Adjoint Energy Transport Code in Complex Three-Dimensional Geometry, contributed by Radioptics, Inc., Plainview, New York; U. S. Naval Radiological Defense Laboratory, San Francisco, California; and Office of Civil Defense, Washington, D. C. (NRDL-TRC-68-25, NRDL-TRC-68-27) Available for CDC-6600.

MODIFICATION TO CODE PACKAGE CCC-17E/05R

The IBM 360/75 version of GEOM in the 05R code package has been updated to include subroutines NORML and GOMFLP for slabs, spheres, and cylinders. This new version of GEOM may be requested separately from the CCC-17 code package.

CORRECTIONS TO CODE PACKAGES

CCC-107A/ETRAN 15

The statement INCLUDE CSTORE in the various subroutines should be changed to INCLUDE CSTOR

CCC-107C/ETRAN 16 B

In subroutine XRAY, insert the statement GO TO 210 just before statement 200.

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CCC-81B/UNC-SAM 2

A mistake in the UNC-SAM 2 code affects the estimation of flux-at-a-point following inelastic interactions. The following correction in subroutine CARLO is necessary:

statements 805 ff. read:

```
805 TT=T  $  T=TP  $ CALL FAP (FWATE,XC)  $  T=TT  $  GO TO 270
```

but should be:

```
805  TT=T  $  T=TT  $ EE=E  $ E=EPRIM
CALL FAP (FWATE,XC)  $ E=EE  $ CALL DR (1,NREG)  $ GO TO 270
```

RSIC tapes have been updated to include this correction.

We are indebted to Lt. W. Coleman of USANDL for pointing this out.

UPDATE OF CCC-112B/SAND, 360/75 Version

Subroutine VIF is correct and works on our compiler, but we understand that some installations are having trouble. Therefore, as of May 1969 our master tapes were updated by moving statement #200 to immediately precede statement #204. Statement 202 may also be moved, if the user desires.

VISITORS TO RSIC

Visitors to RSIC during the month of June are: Capt. Marvin L. Alme, USAF, High Altitude Group, Air Force Weapons Laboratory, Kirtland AFB, New Mexico; W. L. Bunch, Battelle-Northwest, Richland, Washington; David Clifton, Systems Technology Corporation, Dallas, Texas; S. A. W. Gerstl, Westinghouse Advanced Reactor Division, Pittsburgh, Pennsylvania; W. Reed Johnson, USAEC and University of Virginia, Charlottesville, Virginia; Wolfgang P. Neuendorf, Bechtel Corporation, San Francisco, California; Rajendra B. Vora, Bhabba Atomic Research Centre, Bombay, India (at present with Health Physics Division, ORNL).

JULY ACCESSION LIST OF LITERATURE

The RSIC is now aware of the literature cited in the following list. This literature has either been obtained by RSIC or has been placed on order. When received, this material will be examined and assigned to various files if suitable for our information system. The accession list is divided into three fields (1) reactor and weapons shielding, (2) space and accelerator shielding, and (3) shielding computer codes. These titles are announced before processing and indexing so that there will be no delay and can serve as a prompt announcement of current literature.

RSIC is not a documentation center. Copies of the literature cited must generally be obtained from the author or from a documentation center such as the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

RSIC maintains a microfiche file of literature entered into its information system. Computer searches of this system (which produces a special bibliography) and duplicate microfiche copies of the literature in our file are available upon request. Naturally, we cannot supply copies of literature which is copyrighted (such as books or journal articles) or whose distribution is restricted. Neither service is yet available for the codes literature.

REACTOR AND WEAPONS SHIELDING

AAEC/TM-480 — October 1968

Design and Testing of a Type B Packaging (AUS/S/200) for Large Radioactive Sources to the Requirements of the International Atomic Energy Agency
R. H. Nelmes
Available: AEC Depository Libraries

AFWL-TR-68-134 — March 1969

High Energy Neutron Cross Section Validation and Neutron Flux Spectrum Using the Henre Source
R. C. Barrall, J. A. Holmes, M. Silbergold

ANL-7282 — November 1968

Proceedings of the Conference on Slow-Neutron-Capture Gamma-Ray Spectroscopy Held at Argonne National Laboratory, November 2-4, 1966.

DASA 2219 (NRSS-11) — February 1969

A Study of the Relationship Between the Neutron Absorbed Doses in an Underground Structure and in a Semi-Infinite Medium
R. W. Roussin

EUR-4208.e 1968

Deposition of Fission Energy in ORGEL-Type Reactor
B. Haytink, E. Schmidt
Available: AEC Depository Libraries

FTD-MT-24-79-68 May 17, 1968

Experimental Data on Shielding Attenuation of Gamma Radiation of Extended Sources
D. P. Osanov
Available: CFSTI as N69-18018 and AD-679515

FTD-MT-24-82-68 May 30, 1968

Certain Problems Concerning Radiation in an Unlimited Medium with Evenly Distributed Isotropic Sources
V. V. Pavlov
Available: CFSTI as AD-679538 and N69-17561

IKF-21 (In German) September 1968

Energy Distribution and Dose Rate of Gamma Rays from Radioactive Clouds on the Earth's Surface (Thesis)
A. Schmidt
Available: AEC Depository Libraries

INR-966 1968

Semi-Infinite Albedo Problem
R. Bednarz, A. Kuszell
Available: AEC Depository Libraries

INR-P-956 1968

Equivalence of Integral Transform and Spatial Spherical Harmonics Methods
J. Mika, R. Stankiewicz

KFK-722 November 1968

The Amounts of Fission Product Nuclides Produced in 239-Pu-Fuelled Fast Reactors and the Related Heat Generation After Shut-Down
D. Gupta, F. Heller, R. Schroeder
Available: AEC Depository Libraries

KFK-865 October 1968

Tables of Experimental Absolute Total Absorption Probabilities, Intrinsic Efficiencies and Peak-to-Total Ratios for Lithium-Drifted Germanium Diodes
W. Michaelis

KFK-880 December 1968

Card Image Format of the Karlsruhe Evaluated Nuclear Data File Kedak
D. Woll

KV-550 April 15, 1969

Demonstration Fuel Element Shipping Cask from Laminated Uranium Metal. Part I. General Information, Background, and Design
C. W. Loveland, D. H. Stitt, S. Bernstein
Available: AEC Depository Libraries; CFSTI

LA-4030 March 19, 1969

An Analytical Method for Unfolding Gamma-Ray Spectra
W . M. Sanders, D. M. Holm

LA-4072 March 18, 1969

An Alternate Direction, Discrete Ordinates Method
B. G. Carlson
Available: CFSTI

LA-4079 March 17, 1969

Compton Scattering Factors for Aspherical Free Atoms
D. T. Cromer
Available: AEC Depository Libraries; CFSTI

N69-16912 November 15, 1967

Titanium Removal Cross Section for a Layer in a Hydrogen-Containing Medium
Yu. A. Yegorov, et al.
In: *Questions of the Phys. of Reactor Shielding* (pp. 15-19)
Available: CFSTI

N69-16911 November 15, 1967

Spectra of Fast Neutrons in Metal-Water Shielding
D. L. Broder, et al.
In: *Questions of the Phys. of Reactor Shielding* (pp. 1-14)
Available: CFSTI

NASA-TM-X-52521 (E-4829) 1969

Use of Faster Code for Significantly Reducing Ducted Reactor Shield Computation Time
M. L. Wohl, T. M. Jordan
Available: CFSTI as N69-16116

NASA-TM-X-52602 June 19, 1969

Resonance Neutron Capture in a Thick Slab of Depleted Uranium
G. P. Lahti

NBS-10 037 May 16, 1969

Evaluation of the Reduction Factor in the Basement of a Structure
C. Eisenhauer, A. L. Kaplan

NDL-TR-119 (AD848082) January 1969

Atmospheric Transport of Radiation Including Abstracts of Selected Computer Codes
A. T. Futterer

ORNL-TM-2508 June 1969

The Use of Kernels in Studying Neutron Transport Problems (Thesis*)
S. N. Cramer*, V. R. Cain, R. R. Coveyou, P. N. Stevens, E. A. Straker

ORNL-TM-2542 March 20, 1969

Measurement of the Fast-Neutron Dose Rate Transmitted Through a LiH Shield When Used as a Window in Iron-Oil Shield Mockups
F. J. Muckenthaler

ORNL-TM-2574 April 28, 1969

Dose Rates in a Slab Phantom from Monoenergetic Gamma Rays
H. C. Claiborne, D. K. Trubey
Available: CFSTI

ORNL-TM-2591 May 29, 1969

A Simple Method for Determining a Combined Lead-Steel Shield for Shipping Casks that is Equivalent to a Lead Shield
M. Solomito, H. C. Claiborne

ORNL-TR-2034 (Translated from J. Nucl. Energy, 22(4), 231-249, April 1968)

Activity of the Fission Products of U-235 and Pu-239
R. de Tourreil

ORO-2791-28 January 1969

A Compilation of Cross Sections and Angular Distributions of Gamma Rays Produced by Neutron Bombardment of Various Nuclei
P. S. Buchanan

PB-183064 1968

On the Derivation of New Approximations for the Monoenergetic Boltzmann Equation Using a Self-Adjoint Variational Principle
H. Kalli, P. Jauho
Available: CFSTI

R-OU-295 (Final Report) December 1968

Statistical Analysis of NFSS Protection Categories
R. O. Lyday, G. M. Botkin, E. L. Hill, F. G. Giesbrecht

RRA-M91 June 13, 1969

Analysis of Initial Radiation Protection Aboard Ship
R. L. French, J. M. Newell

RT/FI-(68)55 *1968*

Fast Neutron Radiative Capture
G. Longo, F. Saporetti
Available: AEC Depository Libraries

SLAC-Trans-93 (Translated from Izv. Akad. Nauk Azerb. SSR, Ser. Fiz.-Tekh. Mat. Nauk, No. 3, 131-4 (1964))

Angular Distribution of Thick-Target Gamma Bremsstrahlung
R. A. Mamedov, E. A. Kramer-Ageev, V. I. Pozdnyakov
Available: AEC Depository Libraries; CFSTI

UCRL-13263 (N68-12732, CONF-66120-16) *1966*

Linac Measurements of the Fast Neutrons Response of Organic Scintillators
E. Yates, D. Crandall, J. Kirkbride

UCRL-50570 *January 8, 1969*

Neutron Air Transport Calculations
W. M. Webster
Available: AEC Depository Libraries; CFSTI

USNRDL-TRC-69-1 (NRSS-9) *May 1969*

Experimental Determination of the Gamma-Ray Shielding Characteristics of a Ribbed Slab
D. W. Green, K. Priess, S. P. Chilton, A. B. Chilton

VERTEX TR 68-1 *October 1968*

Open Shelter Feasibility Study
H. M. Childers, C. A. Vansant, D. F. Mokrauer

WAPD-TM-771 *February 1969*

Extremium Variational Principles for the Monoenergetic Transport Equation with Arbitrary Adjoint Source
A. J. Buslik

ENERGA NU. M., 12(54), 395- (1968)

(SP) Biological Protection of Reactor Coral-1
J. Azcue, A. Rovira

HEALTH PHYS., 16(4), 503- (1969)

Gamma Radiation Damage of Structural Concrete Immersed in Water
J. F. Sommers

NUCL. APPL., 6(6), 588-593 (June 1969)

Gamma-Ray Buildup Factors for Sand, Air, and Wood (Cellulose)
F. H. Clark

NUCL. INSTR. METHODS, 68, 293-297 (1969)

A Monte Carlo Study of Neutron Collimation by Rectangular Tubes
A. Choudry, P. K. Bandopadhyay

NUCL. SCI. ENG., 36(3), 447-450 (June 1969)

Application of the J_N Method to Neutron Transport in Slabs and Spheres
H. Kschwendt

NUCL. SCI. ENG., 36(3), 295-303 (June 1969)

A Numerical Treatment of the Attenuation of Neutrons by Air Ducts in Shields
R. Artigas, H. E. Hungerford

J. MATER., 3, 757-9 (Dec. 1968)

Low Radioactivity Concrete
H. A. Wollenberg, A. R. Smith

IZV.VYSSH. UCHED ZAVED, No. 10, 147-9 (1968) (In Russian)

Study of Energy and Angular Distributions of Electrons Behind Barriers of Different Thickness
B. A. Kononov, E. A. Gusev

BOOK (NAS Publication 1593) *1969*

Semiconductor Nuclear-Particle Detectors and Circuits
Editors: W. L. Brown, W. A. Higinbotham, G. D. Miller, R. L. Chase
National Academy of Sciences, Printing and Publishing Office, 2101 Constitution Ave., Washington, D.C. 20418 (798 pp.)

BOOK *1968*

Interaction of Photons and Leptons with Matter
R. R. Roy, R. D. Reed
Academic Press

SPACE AND ACCELERATOR SHIELDING

AD-681007 (N69-20627) *December 1968*

Some Observations on Energetic Electrons in the Outer Van Allen Zone, etc.
C. Rao
Iowa University, Iowa City, Dept. of Physics & Astronomy

AD-681151 (N69-20658) *November 1968*

Trapped Energetic Alpha Particles in the Outer Radiation Belt
G. A. Paulikas, J. B. Blake

AFCRL-68-0666 December 1968

Corpuscular Radiation: A Revision of Chapter 17, Handbook of Geophysics and Space Environments
R. C. Filz, L. Katz, et al.

ANL-Trans-724 (JINR-P1-4081 in Russian)

Range and Ionization Losses of Proton Energy in Different Materials
I. M. Vasilevskii, I. I. Karpov, V. I. Petruhkin, Yu. D. Prokoshkin

AWRE-0-64/68 December 1968

Radiological Dose to the SST Concorde from Galactic Cosmic Rays
E. W. Fuller, N. T. Clarke
Available: AEC Depository Libraries; CFSTI; UK 3s 3d

BMwF-FB-W-69-01 (N69-21077) January 1969

Radiation Effects of Solar Flares on Earth Satellites and Solar Probes
K. Wohlleben

CEA-CONF-1087 (In French)

Energy Losses of Electrons in Material: Method of Calculation Results
E. Bertel, H. Joffre, L. Pages, L. Sklavenitis

CERN/ECFA/66/WG2/US-SG5 May 30, 1967

Muon Shielding Calculations I.
In: *Util. Studies for a 300 GeV Proton Synchrotron, Vol. 2*
(pp. 343-370)
P. E. Kuhlmann, H. O. Wuester
Available: CFSTI as N69-18928

CERN/ECFA/67/WG2/US-SG5/PEK May 1967

Remarks on Shielding for Area I.
In: *Util. Studies for a 300 GeV Proton Synchrotron, Vol. 2*
(pp. 371-375)
P. E. Kuhlmann, H. O. Wuester
Available: CFSTI as N69-18929

JINR-P2-4402 (In Russian) 1969

Inelastic Interactions of High-Energy Protons with Atomic Nuclei
V. S. Barashenkov, K. K. Gudima, V. D. Toneev
Available: AEC Depository Libraries

MPS/INT-MU/EP-1 (N69-18927) May 1967

Monte Carlo Calculation of the Nucleon Meson Cascade in a Block of Shielding Material--Attenuation of Strong Interacting Particle Densities Perpendicular to the Direction of the Primary Beam
In: *Util. Studies for a 300 GeV Proton Synchrotron, Vol. 2*
J. Ranft
Available: CFSTI

N69-19899 (NASA-CR-123) August 1968

An Experimental Study of Electron Fluxes from 50 KeV to 4 MeV in the Inner Radiation Belt
K. A. Pfitzer

NASA-CR-100031 (NAMI-1054) December 13, 1968

Comparative Evaluation of the Radiation Environment in the Biosphere and in Space
H. J. Schaefer
Available: CFSTI as N69-19054

ORNL-TM-2361 March 14, 1969

Intranuclear-Cascade Calculation of the Secondary Nucleon Spectra from Nucleon-Nucleus Interactions in the Energy Range 340 to 2900 MeV and Comparisons with Experiment
H. W. Bertini, A. H. Culkowski, M. P. Guthrie

ORNL-TM-2559 April 25, 1969

Calculation of the Energy Deposited in Thick Targets by High-Energy (1 GeV) Electron-Photon Cascades and Comparison with Experiment
R. G. Alsmiller, Jr., H. S. Moran

ORNL-TR-2148 (JINR-P2-4183 *in Russian*) 1968

Energy Dependence of Interaction Cross Sections of Nucleons with Atomic Nuclei at Energies Higher than 50 MeV
V. S. Barashenkov, K. K. Gudima, V. D. Toneev

ORNL-TR-3025 (*Bull. Inform. Sci. Tech., No. 109, 21-38 (1966) (In French)*

Studies on Shielding and Shielding Concretes (General Remarks on the Attenuation of Radiation in Materials and on the Constitution of Shielding Concretes. Experiments and Measurements on Attenuation in Concretes)
M. Condat, P. Lafore, M. Lott, J. Rastoin
Available: AEC Depository Libraries; CFSTI

PPAD-655E April 10, 1969

Angular Distribution of Integrated Hadron Fluxes Due to 3 GeV Protons
M. Awschalom, W. Schimmerling

J. GEOPHYS.RES., 74, 743-54 (Feb. 1, 1969)

Differential Energy Spectrum of Protons, Helium Nuclei, and Electrons
G. D. Badhwar, C. L. Deney, M. F. Kaplon

NUCL. INSTRUM. METHODS, 66, 293-303 (Dec. 15, 1968)

Shielding of Muons Around High Energy Electron Accelerators: Theory and Measurement
W. R. Nelson

NUCL. NEWS, 12(2), 47-9 (Feb. 1969)

High-Energy Accelerator Shielding
R. G. Alsmiller, Jr., F. S. Alsmiller

PHYS. REV., 176, 1661-73 (Dec. 25, 1968)

Experimental Tests of Cascade Theory at High Energies
R. Holynski, W. V. Jones, K. Pinkau

IZV. VYSSH. UCHEB. ZAVED., No. 10, 147-9 (1968) (In Russian)

Study of Energy and Angular Distributions of Electrons Behind Barriers of Different Thickness
B. A. Kononov, E. A. Gusev

BOOK *1968*

RADIATION PROTECTION PART 2 (Pages 871-93)
Eds. W. S. Snyder, H. H. Abee, L. K. Burton, R. Maushart, A. Benco, F. Duhamel, B. M. Wheatley
Article: Results of a Space Dosimetry Experiment to Assess Radiation Protection Calculations for Manned Space Flight
M. C. Chapman, R. E. Fortney, F. E. Holly, R. Stovall
New York, Pergamon Press Inc.

JPRS-47311

USSR ACHIEVEMENTS IN SPACE RESEARCH (FIRST DECADE IN SPACE, 1957-1967)
A. A. Blagonravov (ed.)
Nauka, Moscow, 1968 (617 pages)
Available: CFSTI

COMPUTER CODES LITERATURE

NDL-TR-124 *May 1969* *PROFET*

PROFET - A Rapid Method for Generating Fallout Predictions from Field Data
by D. K. Winegardner
FORTRAN IV for UNIVAC 1108

AMSAA TR 10 — February 1969 — MAGIC SAM C

The MAGIC-SAM C Target Analysis Technique - Volume I - Combinatorial Geometry and Its Application to Armored Combat Vehicles for Both Nuclear and Conventional Vulnerability
by R. C. Hoyt
FORTRAN

BNWL-991 — December 1968 — OPTIM

OPTIM - A Multidimensional Nonlinear Optimization Code
by D. R. Hafner
FORTRAN V for UNIVAC 1108

CEA Note N 824 (ORNL-tr-2041) October 1967 — PEPIN LE BREF

Program for the Calculation of Fission Product Activity
by Roland de Tourreil
FORTRAN IV for UNIVAC 1107

DAC-62231 — April 1969 — CHARGE

CHARGE Code for Space Radiation Shielding Analysis
W. R. Yucker and J. R. Lilley
FORTRAN IV for IBM 7094, 360, UNIVAC 1108, and CDC 6600

EIR-BERICHT-NR. 140 (ORNL-tr-2115) August 1968 — KINF

KINF - A Program for Two-Dimensional Reactor Cell Calculations by the Monte Carlo Method
by J. Marti
CDC 6500

GESP-226 — 1969 — NSP

NSP Kernel-Diffusion Library, KDLIBE, Ns0910
by W. B. Henderson and W. E. Edwards
FORTRAN IV for GE-635

RCN-94 (mf) — October 1968 — MICROFLUX-2

MICROFLUX-2 - A Program for the Calculation of Thermal Group Constants by Solving the Energy and Space Dependent Integral Transport Equation
by A. Tas, D. van Ligten, and A. W. den Houting
ALGOL for PHILIPS-ELECTROLOGICA x8

USNRDL TRC-68-51 — January 1968 — DISC RECS

An Empirical Formula for Concrete Slab Penetration by Plane Parallel Gamma-Ray Beams
by G. R. Thayer, R. W. Roussin, and A. B. Chilton
FORTRAN IV for IBM 7094

USNRDL-TRC-68-56 January 1969 TERF

The TERF Program and Its Application to the Calculation of Fallout Radiation Dose
by R. Goldstein
FORTRAN for CDC 6600

WAPD-TM-822 March 1969 EMPIR

EMPIR - A Program to Solve the Multi-Group Slab Transport Problem Using the ENDF/B Library
by J. D. Butler, E. M. Gelbard, and E. Schmidt
FORTRAN IV for CDC 6600