

RSIC Newsletter



RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

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

POST OFFICE BOX X •
OAK RIDGE, TENNESSEE 37831

No. 32

July 17, 1967

DISCRETE ORDINATES (S_N) SEMINAR-WORKSHOP

A seminar workshop will be held at the Oak Ridge National Laboratory on August 14, 15, and 16, 1967, under the sponsorship of the Radiation Shielding Information Center and the Computing Technology Center (CTC) with the general theme "The Discrete Ordinates (S_N) Method for Radiation Transport Calculations." The purpose of the seminar is to review the state-of-the-art of the Discrete Ordinates Method and to conduct a workshop in the use of the ANISN code which is now available from RSIC.

The seminar-workshop will be divided into six half-day sessions. The first session will be devoted to invited papers treating some aspect of the theory. Bengt Carlson of LASL, Kaye Lathrop of GA, and Fred R. Mynatt of CTC have been invited to speak in this session. Sessions 2 and 3 will be devoted to contributed papers on applications of interest for which a 600-word summary is requested for proceedings which will be published. Several papers have been solicited and additional ones will be welcomed. Sessions 4, 5, and 6 will be devoted to a workshop on the ANISN code to be conducted by members of the CTC staff.

Anyone wishing to attend should notify the RSIC Codes Coordinator, Mrs. Betty F. Maskewitz, Oak Ridge National Laboratory, P. O. Box X, Oak Ridge, Tennessee 37830, or telephone 615-483-8611, ext. 3-6944, or FTS 615-483-6944.

RECENT VISITORS TO RSIC

The following people visited RSIC during the month of June 1967: A. G. C. Mauperon, EURATOM, Brussels, Belgium; T. E. Hughes, DTIE, Oak Ridge; S. C. Jain, National Physical Laboratory, New Delhi, India; and Eva Pederson, Danish AEC, Roskilde, Denmark.

JUNE 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 of (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 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

J. Appl. Phys., 37, 4826-4831 (1966)

Age Approximation to X-Ray Transport
W. S. Hogan

Sov. J. Atomic Energy, 20(3), 297 (March 1966)

On the Theory of the Passage of γ -Quanta through a Slab of
Finite Thickness
V. S. Galishev

Sov. J. Atomic Energy, 20(3), 295-296 (March 1966)

Contribution to the Theory of Neutron Transfer in a Medium with
Random Inhomogeneities
A. V. Stepanov

Isotopenpraxis, 2, 354-7 (September 1966) (German)

Investigation of Gamma-Ray Backscattering for Broad Radiation
Beams
S. Koch

Sov. J. Atomic Energy, 20(3), 298 (March 1966)

Reflection of Fast Neutrons from a Water Surface
L. M. Shirkin

- Sov. J. Atomic Energy, 20(2), 152-157 (February 1966)
Distribution of γ -Ray Intensity Inside Straight, Cylindrical Ducts
V. P. Mashkovich and V. A. Klimanov
- Sov. J. Atomic Energy, 20(2), 191-193 (February 1966)
Measurement of Fast Neutron Fluxes in the IRT-2000 Reactor
K. K. Baltmugur, D. Ya. Gubatova, and R. Ya. Kemer
- Sov. J. Atomic Energy, 20(2), 197-199 (February 1966)
Approximate Similarity of Neutron Fields Formed by Sources with
Different Spectra
D. A. Kozhevnikov
- Sov. J. Atomic Energy, 20(2), 200-201 (February 1966)
The Angular Distribution of Doses of Neutrons Scattered by Shields
E. A. Kramer-Ageev and V. S. Troshin
- Sov. J. Atomic Energy, 20(2), 202-204 (February 1966)
The Angular Distribution of Energy and Dose of Scattered Neutrons
in Water
L. M. Shirkin
- J. Nucl. Sci. Technol., 4(1), 32-36 (January 1967)
Spatial Distribution of Gamma-Rays from a Cylindrical ^{60}Co Source
Y. Kanemori
- J. Nucl. Sci. Technol., 4(1), 27-31 (January 1967)
Iterative Method of Multi-Pole Source-Sink Calculation
K. Kawashima
- J. Nucl. Sci. Technol., 4(1), 21-26 (January 1967)
Monoenergetic Neutron Leakage from One-Dimensional Small Systems
Y. Fukai, K. Makino
- Phys. Rev., 153, 307 (1967)
X-Ray Attenuation Coefficient Measurements
J. H. McCrary, E. H. Plassman, J. M. Puckett, A. L. Conner, and
G. W. Zimmerman
- J. Phys. (Oct. 1966)
Analysis of Radioactivity Decay Curves
S. Couchoud
- Nuovo Cimento (10), 44B: 178-81 (July 11, 1966)
Neutrons from (α, n) Sources
A. Rubbino, D. Zubke, and C. Meixner

Plasma Phys., 9, 169 (1967)

Neutron Spectra in H₂O from a Fusion Source
A. L. Deleray, R. C. Axtmann and M. D. Kostin

Atomkernenergie 11-41, 247-250 (1966)

Radiation Field of a Disk-Source in a Homogeneous Absorbing
Half-Space
Von H. Schultz and C.-D. Wuncke

Health Phys., 13(2), 213-219 (Feb. 1967)

Average and Effective Energies, Fluence-dose Conversion Factors
and Quality Factors of the Neutron Spectra of Some (α ,n) Sources
D. Naghtigall

Nucl. Instr. Methods, 46(2), 309 (1967)

A Fast-Neutron Spectrometer for Reactor Environments
V. V. Verbinski and M. S. Bokhari

Intern. J. Appl. Radiat. Isotop., 18: 33-44 (January 1967) (German)

Dosimetry and Shielding with a 14-MeV Neutron Generator
J. Hacke

Int. J. Appl. Radiat. Isotop., 18: 77-81 (January 1967)

Flux Density Close to the Target of a Neutron Generator
P. E. Wilkniss, G. J. Wynne

Health Phys., 13(4), 405-407 (April 1967)

Tables for Calculating Geometry Factors for Disk Sources and
Detectors
C. L. Lindeken and D. N. Montan

Health Phys., 13(3), 298 (March 1967)

Comment on Attix' Article "The Meanings of First Collision
Dose"
D. K. Trubey and Francis H. Clark

Health Phys., 13(3), 287-292 (March 1967)

Betonite as a Protective Cover for Buried Radioactive Waste
R. H. Hawkins and J. H. Horton

Health Phys., 13(2), 149-161 (Feb. 1967)

Estimation of the Air Dose from the Atomic Bombs in Hiroshima
and Nagasaki
T. Hashizume, T. Maruyama, A. Shiragai, E. Tanaka, M. Izawa,
S. Kawamura and S. Nagaoka

CEX-62.80b

Small Boy Project 62.80b - Aeroradioactivity Survey
Edgerton, Germeshausen and Grier, Inc. - May 1967

Ark Fysik, 33(3), 37-46 (1967)

Fast Neutron Capture Gamma-Ray Spectra in Rb, Sr, Y, Zr, and Nb
B. Lundberg and N. Starfelt

Atomkernenergie, 12, 20-24 (1967)

An Analytical Solution of Multilayer Problem in Buildup Calculation
W. Zumach

Nippon Genshiryoku Gakkaishi, 8: 474-80 (Sept. 1966) (Japanese)

Neutron Attenuation Through Iron Layer in Light Water
H. Yamaki, Y. Fukushima

Fuji Jiho, 39: 773-7 (November 1966) (Japanese)

Neutron Attenuation by Steel Embedded Concrete
K. Hirai

Brit. J. Appl. Phys., 17: 1545-52 (Dec. 1966)

The Diffusion of Water in Concrete at Temperatures Between 50
and 95 Deg C.
B. P. Hughes, I. R. G. Lower, J. Walker

Nucl. Phys., 93, 673 (1967)

Elastic Scattering of 7 to 14 MeV Neutrons from Nitrogen
R. W. Bauer, J. D. Anderson, H. F. Lutz and C. Wong

LA-DC-8437

An Expression for the Remainder in the Spherical Harmonics
Method
W. L. Hendry

WAPD-TM-599

Identification of Important Fission Product Nuclides for Radio-
logical Dose Calculations Following a Uranium 235-Fueled Reactor
Accident
D. R. Connors, H. J. Litke, et al. - February 1967

AECL-2657

Measurement of Neutron Fluence by Fission Fragment Damage Track
Detection
R. C. Bhatt - August 1966

AD-630121 (RM-4906-PR)

New Initial Value Method for Internal Intensities in Radiative Transfer
H. H. Kagiwada, and R. E. Kalaba

ORNL-4113

Radiation Dosimetry Studies at the Health Physics Research Reactor
D. R. Johnson and J. W. Poston - June 1967

USNCEL-TR-523

Experimental Determination of Neutron Energy Spectra in Concrete Ducts
Leonard B. Gardner, Alan J. Mettler, and Bernard Burdick - May 1967

Jul-435-ST

Measurement of Flux Density and Dose Rate Removal Cross Sections of Various Shielding Materials for Neutrons
D. Nachtigall and M. Heinzelmann - Dec. 1966

NP-16508

One-Speed Transport Theory with Anisotropic Scattering Application to the Slab Albedo Problem. Part I. Theory
H. G. Kaper - July 1966

UCID-15133

Notes on Monte Carlo Method for Non-Linear Radiation Transport in General and on the Indigo Code in Particular
Robert Nelson - January 12, 1967

UJV-1663

Temperature Distribution in a Nuclear Reactor Shielding Block
J. Pfann - 1966

IN-1072

Neutron Flux Measurement at the MTR Beam Hole HB-3
W. R. Myers and R. E. Schmunk - May 1967

TRG-1429 (D)

Gamma and Neutron Fluxes in the Dounreay Fast Reactor
A. G. Edwards and H. Atkinson - Oct. 6, 1966

NP-16652

Radiation Safety Manual
VA Hospital, Omaha, Nebraska - January 1, 1966

AERE-M-1850

Angular Parameters of Neutron Reactions as a Measure of Neutron Energy
M. G. Silk - March 1967

JAERI-1124

Gamma-Ray Spectra of Fission Products
Y. Kamemoto - September 1966

LA-DC-8478

Biorthogonal Angular Polynomial Expansion of the Two Dimensional Transport Equation
K. D. Lathrop and N. S. DeMuth

IFA-FR-51

Neutron Transport Theory. II. Bibliography and Subject Index
T. Rosescu - August 1966

EIR-98

Analytical Solution of the Energy Dependence of Neutron Transport Equations in the S_N Formulation
H. Beuchat - Nov. 1966

BMwF-FBK-67-09

The Multiple Scattering of Gamma-Rays in Media with Low Atomic Number
A. Schaarschmidt - January 1967

USNRDL-TR-67-14

The NRDL Gamma-X-Ray Scattering Facility
W. J. Gurney - December 22, 1966

KY-521

Design and Fabrication of a Prototype Laminated Uranium Metal Shipping Cask for Large Shipments of ^{60}Co
C. B. Clifford - April 3, 1967

LA-DC-8706

Stochastic Formulations of Neutron Transport
G. L. Bell - 1966

ORO-2791-21

A Compilation of Gamma Ray Angular Distribution Coefficients
S. C. Mathur, P. S. Buchanan, et al.

PG-774 (CC)

Thermal Neutron Depth Dose Dependence on Beam and Phantom Size for Incident Collimated Beams of Fast Neutrons
R. C. Lawson and D. E. Watt - 1967

USNCEL-TN-882

Shielding Considerations in the Design of Hardened Structures
C. M. Huddleston and D. R. Doty - March 1967

Atomkernenergie 12, 81 (1967)

A Generalized Gamma Transport Program: BIGGI
H. Penkuhn

Sov. J. Atomic Energy, 20(4), 354 (April 1966)

Backscattering of Low-Energy Gamma Radiation
D. B. Pozdneev

Sov. J. Atomic Energy, 20(4), 361 (April 1966)

The Transmission of High Energy Neutrons in Iron-Water Mixtures
B. S. Sychev, V. V. Mal-kov, M. M. Komochkov, and L. N. Zaitsev

Sov. J. Atomic Energy, 20(4), 386 (April 1966)

Mean Spectra of the Neutrons in Double and Triple Fission of U-235 by Thermal Neutrons
V. N. Nefedov, N. I. Kroshkin, V. P. Kharin, and A. K. Mel'nikov

Sov. J. Atomic Energy, 20(4), 393 (April 1966)

Flow of Radiation for a Cylindrical Channel and a Plane Slit in a Shield
V. P. Zharkov and E. A. Panov

Sov. J. Atomic Energy, 20(4), 405 (April 1966)

Energy Build-up Factors for Cosine Sources in Iron and Lead
A. M. Panchenko

Sov. J. Atomic Energy, 20(4), 407 (April 1966)

Backscattering of Low-Energy γ Rays from Shields of Finite Thickness
D. B. Pozdneev, and S. A. Churin

Sov. J. Atomic Energy, 20(4), 410 (April 1966)

Transmission of High-Energy Neutrons through Heavy Concrete Shielding
B. S. Sychev, V. V. Mal-kov, M. M. Komochkov, and L. N. Zaitsev

- Sov. J. Atomic Energy, 20(5), 469 (May 1966)
Distribution of Fast Fission Neutrons along Straight, Cylindrical
Ducts in Water
V. P. Mashkovich, A. N. Nikolaev, V. K. Sakharov, B. I. Sinitsyn,
and S. G. Tsypin
- Sov. J. Atomic Energy, 20(5), 481 (May 1966)
Dependence of Buildup Factor on Detector Position Outside Shield-
ing
Y. A. Kazanskii, V. I. Kukhtevich, V. I. Popov, V. V. Tarasov, and
B. P. Shemetenko
- Sov. J. Atomic Energy, 20(5), 484 (May 1966)
 γ -Ray Shielding of Artificial Stone
V. B. Dubrovskii, A. K. Shreiber, A. F. Mirenkov, and V. N. Solov'ev
- Sov. J. Atomic Energy, 20(5), 493 (May 1966)
Measurement of Fast Neutron Absorption Cross Sections with a
Resonance Detector in Water
Y. Y. Stavisskii, et al.
- Sov. J. Atomic Energy, 20(5), 528 (May 1966)
The Unit of Measurement for Biological Dose of Ionizing Radiation
Y. V. Sivintsev
- J. Nucl. Sci. Technol., 4(3), 115 (March 1967)
Interaction of Adjacent Thermal Neutron Detectors in Water
S. Izumi and C. Watarumi
- J. Nucl. Sci. Technol., 4(2), 98 (Feb. 1967)
Semi-analytical Estimation of Gamma-Ray Intensity from a Volume
Source
Y. Kanemori
- Nucl. Instr., 51, 129 (1967)
Tissue Current-to-Dose Conversion Factors for Neutrons with
Energies from 0.5 to 60 MeV
D. C. Irving, R. G. Alsmiller, and H. S. Moran
- Nucl. Instr., 50, 302 (1967)
Monte Carlo Study of a Method for Lunar (Surface) Analysis Based
on Spectroscopy of Gamma Rays Following 14-MeV Pulsed-Neutron
Bombardment
M. Leimdorfer and R. T. Boughner

Phys. Rev., 155, 1368 (1967)

Neutron-Capture Gamma-Ray Studies in Isotopes of Tungsten
R. R. Spencer and K. T. Faler

BOOK

Radiation Shielding, Analysis and Design Principles as Applied
to Nuclear Defense Planning
Compilation of lectures and papers presented at the Kansas
State University Summer Institute - 1967

J. Atomic Energy Soc. of Japan, 8(12), 636-642 (Dec. 1966) (Japanese)

A Surface Method for Calculating Radiation Penetration through
Secondary Shields
M. Kitazume

Phys. Rev., 155, 1301 (1967)

Gamma-Ray Spectra from Radiative Capture of Thermal and Resonance
Neutrons in Mercury and Tungsten
E. R. Rae, W. R. Moyer, R. R. Fullwood, and J. L. Andrews

Space and Accelerator Shielding

N66-35503 (AD-634824) Vol. II, No. 4, p. 207-215 (1965)

Trapped Radiation Model Environments
James I. Vette

NASA-SP-3024 (Vol. III)

Models of the Trapped Radiation Environment. Vol. III. Electrons
at Synchronous Altitudes
James I. Vette, A. B. Lucero, and J. A. Wright - 1967

J. Astron. Sciences, 13(4), 133-152 (July-Aug. 1966)

Radiation Shielding Considerations for Interplanetary Spacecraft
C. F. Kottler, Jr.

Cosmic Research, 4(2), 236-245 (March-April 1966)

Investigation of the Radiation Intensity from the Earth's Radia-
tion Belts on Board the Artificial Earth Satellite Cosmos 17
G. A. Kirdina, I. M. Kulagin, A. B. Malyshev, M. N. Nazarova,
P. M. Svidskii, and I. S. Tudkevich

Sov. J. Atomic Energy, 20(2), 158-163 (Feb. 1966)

Angular Distribution and Yield of Secondary Nucleons from Plane
Shields for 660 MeV Protons
V. A. Kon'shin, E. S. Matusevich, and V. I. Regushevskii

J. Spacecraft Rockets, 3(10), 1544-1546 (Oct. 1966)

Radiation Shielding of Manned Mars Vehicles
Francis W. French

Nucl. Instr. Methods, 48, 261-276 (1967)

Improved Monte-Carlo Calculation of the Nucleon-Meson Cascade
in Shield Material. II. Comparison of the Results for Incident
Proton Beams with Momenta of 10 and 20 GeV/c with Experimental
Data
J. Ranft

Nucl. Instr. Methods, 48, 133-140 (1967)

Improved Monte Carlo Calculation of the Nucleon-Meson Cascade
in Shielding Material. I. Description of the Method of Calcula-
tion
J. Ranft

NASA CR-66110

Atmospheric Transition Curves for Geomagnetically-Sensitive Cosmic
Rays
Robert C. Good, Jr. - March 1966

Radn. Meas. in Nucl. Power, Conference Proceedings, pp. 201-210 (1966)

Neutron Studies in Shields and Tunnels of the 7 GeV Proton
Synchrotron NIMROD K. B. Shaw

Sov. J. Atomic Energy, 18(6), 728-33 (June 1965)

Flux of Secondary Neutrons Produced by 660 MeV Protons in Shield-
ing
V. A. Kon'shin, E. S. Matusevich, and S. S. Prokhorov

N66-38758 (NASA-CR-66202, FHR-1395-3, PCD-TR-66-5)

Solar Flare Hazard to Earth-Orbiting Vehicles - Final Report
April 11, 1966

Phys. Rev. 149, 201-8 (September 1966) (SLAC-FUB-163)

Electron-Induced Cascade Showers in Copper and Lead at 1 GeV
W. R. Nelson, T. M. Jenkins, R. C. McCall and J. K. Cobb

Proceedings of Institute of Environmental Sciences 1965 Annual Technical
Meeting, pp 583-91

Use of Gamma Rays to Measure the Proton Shield Effectiveness of
the Apollo Command Module
R. C. Ross and A. Krumbein

Handbook of Geophysics and Space Environments, Chapter 17, pp 17-1 --
17-31

Corpuscular Radiation

C. Dubs, R. Filz, L. Katz, D. Smart, A. Weinberg, and K. Yates

Annual Review of Nucl. Sci., 16, 291-344 (1966)

Energetic Particles in the Earth's Magnetic Field

K. A. Anderson

Nucl. Sci. Eng., 26, 117-21 (Sept. 1966) (BNL-9692)

Skyshine Considerations for Accelerator Shielding Design

C. H. Distenfeld, R. D. Colvett

SLAC-Trans-57 (Translated from JINR-P9-2933)

Attenuation by Concrete of the Neutron Flux Emitted at 90 Deg
to the Direction of the Primary Proton Beam of the 10 geV Synchro-
phasotron

V. E. Aleinikov, et al. - 1966

AVCO-Everett Research Report 258

The Plastic Radiation Shield: Concept, and Applications to
Space Vehicles

R. H. Levy and F. W. French - April 1967

UCRL-11989

High-Energy Nuclear Cascades in Matter

R. J. Riddell, Jr. - April 7, 1965

UCRL-11315

Cyclotron Shielding

Roger Wallace - August 11, 1965

Shielding Computer Codes

UCID-15095 (microfiche) February 1967 INELAS

Revision of O5R Subroutine INELAS

by W. E. Kane

IBM 7094

KAPL-M-6592 (microfiche) January 1967 DOSE B

DOSE B - A CDC 6600 Program for Calculation of Inhalation and
External Dose for Establishing Reactor Siting Distance Require-
ments

by T. W. Ellison and A. B. Dunham

AWRE-0-69-66 (microfiche) January 1967 REP3
REP3 - A Spatially Dependent Fission Product Poisoning Code for
the IBM 7030
by A. Brickstock and A. R. Davies
IBM 7030

EUR-2985.e (microfiche) June 1966 RDMM
RDMM - A Code for Fast Neutron Spectra Determination by Activation
Analysis
by G. Di Cola and A. Rota
FORTRAN IV or MAP

IA-975 (microfiche) July 1965 MOCK1
Monte Carlo Program for Interactions of High Energy Elementary
Particles in Complex Nuclei
by A. Avni, M. Friedman, D. Kes3ler, and M. Shatz
ALTAC for PHILCO 2000

MND-C-2933 PLMC-1
Neutron Monte Carlo Code for Slab Geometry
by Mark Kniedler and Thomas Jordan
FORTRAN II for IBM 7090

UNC-5157 September 1966 UNC-SAM-2
UNC-SAM-2 - A FORTRAN Monte Carlo Program Treating Time-Dependent
Neutron and Photon Transport Through Matter
by E. S. Troubetzkoy
FORTRAN for CDC 1604-A and BRLESC

NASA TM X-1397 June 1967 QADHD
QADHD Point-Kernel Radiation Shielding Computer Code to Evaluate
Propellant Heating and Dose to Crew During Engine Operation
by Gerald P. Lahti
FORTRAN IV for IBM 7090/7094