RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

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No. 182 *February 1980*

I use not only all the brains I have, but all I can borrow. . . . Woodrow Wilson

MONTE CARLO METHODS SEMINAR-WORKSHOP

Planning continues for the April Monte Carlo Methods Seminar-Workshop. The 3-day RSIC seminar-workshop on the "Theory and Application of Monte Carlo Methods" is planned for April 21–23, 1980 in Oak Ridge, Tennessee.

The seminar will last one and one-half days and will feature presentations on the theory and application of Monte Carlo methods for radiation transport problems in shielding and reactor physics. The proceedings will be published as an RSIC report.

The workshop will occupy one and one-half days and will concentrate on the TRIPOLI-II Monte Carlo system developed by the CEA/CEN/Saclay SERMA Shielding Laboratory, Gif-sur-Yvette, France. The TRIPOLI-II Monte Carlo code represents many years of development and successful application to a wide variety of problems in France. A particularly important recent development with this system is the interfacing of the code to ENDF/B formatted data and/or multigroup data in AMPX format.

Please promptly return the form at the back of this newsletter if you plan to attend. More detailed information will follow in direct mail to those indicating an interest in receiving it.

PRELIMINARY SEMINAR PROGRAM

Monday, April 21, 1980

8:30 a.m.
Registration, Bldg. 4500N East Lobby, ORNL

9:10 a.m.
9:20 a.m. Opening
Monte Carlo Applications at Hanford Engineering Development Laboratory, L. L. Carter (Hanford Engineering Development Laboratory).

9:40 a.m.
VIM—A Continuous Energy Monte Carlo Code at ANL, R. N. Blomquist, R. M. Lell, and E. M. Gelbard (Argonne National Laboratory).

10:00 a.m.
Monte Carlo Perturbation Theory in Neutron Transport Calculations, Matthew C. G. Hall (Imperial College, London).

10:20 a.m.
Break

10:40 a.m.
Sensitivity Studies by the Monte Carlo Method, J. C. Nimal (CEA CEN/Saclay, France).

11:00 a.m.
Criticality Studies by the Monte Carlo Method, J. C. Nimal (CEA CEN/Saclay, France).

11:20 a.m.
Experience with TRIPOLI at ORNL, S. N. Cramer (Oak Ridge National Laboratory).

11:40 a.m.
MORSE: Current Status of the Two Oak Ridge Versions, Margaret B. Emmett and J. T. West, III (Union Carbide Corp., Nuclear Division, Computer Sciences Division at Oak Ridge National Laboratory).

12:00 Noon
Lunch – ORNL Cafeteria

1:30 p.m.
Monte Carlo Methodology and Geometry Modeling for SAM-CE Monte Carlo Calculations, H. Steinberg and E. Troubetzkoy (Mathematical Applications Group, Inc.).

1:50 p.m.
Cross Section Treatment for SAM-CE Monte Carlo Calculations, H. Lichtenstein, E. S. Troubetzkoy, and M. Beer (Mathematical Applications Group, Inc.).

2:10 p.m.
Radiation Streaming Calculations with SAM-CE, N. De Gangi, M. O. Cohen, E. Waluschka, and H. Steinberg (Mathematical Applications Group, Inc.).

2:30 p.m.
Monte Carlo Methodology for Reactor Eigenvalue Calculations as Implemented in SAM-CE, E. Troubetzkoy and H. Steinberg (Mathematical Applications Group, Inc.).

2:50 p.m.
Break

3:10 p.m.
TRX and UO_2 Benchmark Criticality Calculations with SAM-CE, M. Beer, E. S. Troubetzkoy, H. Lichtenstein (Mathematical Applications Group, Inc.), and P. Rose (Brookhaven National Laboratory).

3:30 p.m.
Neutronics Analysis of Major Penetrations in Tokamaks Using the Recursive Monte Carlo Method, M. Goldstein (Nuclear Research Center-Negev, Beer-Sheva, Israel).

3:50 p.m.
KIM: A Two-Dimensional Monte Carlo Program for Thermal Reactors, E. Cupini, A. De Matteis, and R. Simonini (Centro di Calcolo del CNEN, Bologna, Italy).

4:10 p.m.
An Analysis of Ex-Core Detector Response to Core-Water Level Using Monte Carlo Methods, R. J. Cacciapouti, R. D. Lucier (Yankee Atomic Electric Co.), D. R. Harris, and D. Napolitano (Rensselaer Polytechnic Inst.)

4:30 p.m.
Adjoint MC Techniques and Codes for Organ Dose Calculations, L. Koblinger (Central Research Institute for Physics, Budapest, Hungary).

6:30 p.m.
Reception, Holiday Inn, Oak Ridge

7:00 p.m.
Dinner

Tuesday, April 22, 1980

9:00 a.m.
The Status of Monte Carlo at Los Alamos, W. L. Thompson and E. D. Cashwell (Los Alamos Scientific Laboratory).

9:30 a.m.
Geometry in MCNP, Thomas N. K. Godfrey (Los Alamos Scientific Laboratory).

9:50 a.m.
Flux at a Point in MCNP, Edmond D. Cashwell and Robert G. Schrandt (Los Alamos Scientific Laboratory).

10:10 a.m.
Deep-Penetration Calculations, W. L. Thompson, O. L. Deutsch, and T. E. Booth (Los Alamos Scientific Laboratory).

10:30 a.m.
Break

10:50 a.m.
KENO Calculations of Light Water Fuel Lattices, M. J. Hebert, J. A. Handschuh, E. E. Tilat (Yankee Atomic Electric Co.), D. R. Harris, and J. A. Mayer (Worchester Polytechnic Inst.)

11:10 a.m.
KENO V- The Newest KENO Monte Carlo Criticality Program, N. F. Landers and L. M. Petrie (Union Carbide Corp., Nuclear Division, Computer Sciences Division at Oak Ridge National Laboratory).

11:30 a.m.
The TRIPOLI II Code, J. Gonnard, *et al.*

11:50 a.m.
Panel Seminar Summary – "Monte Carlo in the 1980s," R. R. Coveyou, E. M. Gelbard, and M. H. Kalos.

12:15 p.m.
Lunch – Oak Ridge Restaurants

WORKSHOP PROGRAM

1:30 – 4:30 p.m.
TRIPOLI II Workshop, Holiday Inn, Oak Ridge

Wednesday, April 23, 1980

8:30 – 11:30 a.m.
TRIPOLI II Workshop

1:00 – 4:00 p.m.
TRIPOLI II Workshop

MACFARLANE WINS ANS BEST PAPER AWARD

William E. (Bill) Kreger, Chairman of the American Nuclear Society Radiation Protection and Shielding Division, has recently announced that Robert E. MacFarlane was awarded the Division's Best Paper award for his presentation at the San Francisco meeting in November. A staff member of Los Alamos Scientific Laboratory, MacFarlane presented a paper entitled "Energy Balance of ENDF/B-V."

CHANGES IN THE COMPUTER CODE COLLECTION

The following changes were made in January.

CCC-320/DOT IV

A newly frozen version of the IBM 360 version (A) of the DOT IV two-dimensional discrete ordinates code system with space-dependent mesh quadrature has been furnished by the code contributor, Oak Ridge National Laboratory, to replace that previously packaged. The principal change was a correction to the RTFLUM routine which allows scalar flux to be edited from a DOT IV moments file. The code package was extended to include a CDC version (B) of this newly updated code package, also contributed by Oak Ridge National Laboratory. IBM 360/370 and CDC. FORTRAN IV; IBM 360/370 and CDC.

CCC-364/SANDOR

SANDOR, developed from the original ORNL-ORIGEN (CCC-217), was contributed by Sandia Laboratories, Albuquerque, New Mexico. The two code systems will give identical answers for a test problem; however, the operation, input, and output of SANDOR are significantly different from those of the original code. SANDOR is a point code (no spatial dependence) which calculates detailed isotopic

compositions for a wide range of problems involving nuclear reactor fuel irradiation, neutron activation, and radioactive decay. Included in the package is a nuclear data file listing 1063 isotopes containing the nuclear parameters, neutron cross sections and gamma-ray-production data for four reactor types; high-temperature gas-cooled reactor (HTGR), light water reactor (LWR), liquid-metal fast-breeder reactor (LMFBR), and molten-salt breeder reactor (MSBR). SANDOR offers a considerable reduction in central memory requirements compared with the original (ORNL) ORIGEN, uses mass storage for intermediate data storage, and produces reasonably small printouts. Reference: NUREG/CR-0987, SAND 79-0299. FORTRAN IV; CDC-7600.

PSR-105/MINX

The IBM version (B) of MINX, a multigroup interpretation of nuclear cross sections from ENDF/B (standard CCCC-III interface formats), was updated to correct errors which were called to RSIC attention by Tony Strecok, Argonne National Laboratory and John White, UCND Computer Sciences Division at the Oak Ridge National Laboratory. Four cards were found to be missing from the source code. Details of the changes may be requested from RSIC. The CDC version (B) was not affected by this update. FORTRAN IV and Assembler Language.

PSR-144/ALPS

Developed to do analysis of the alpha-ray spectrum, ALPS was contributed by Japan Atomic Energy Research Institute, Tokai, Ibaraki, Japan. Peak fitting is treated in a specific manner, taking the speciality of the relevant spectrum into consideration. The main difference between ALPS and the gamma-ray spectrum analysis code, BOB-75 (PSR-84) is in the fitting subprogram. The basic shape of the alpha-ray response has been determined phenomenologically in the course of the fitting procedure, in such a way that the adopted line shape function results in the best overall fit. Reference: *Nuclear Instruments and Methods*, 148 (1978), 173-178. FORTRAN IV; FACOM 230-75.

PSR-146/ALICE

A statistical model code system with fission competition was contributed by Oak Ridge National Laboratory. Used extensively for the analysis of heavy-ion-induced reactions, it handles excitation energies up to 300 MeV and evaporated particles up to 22 neutrons and 15 protons. Reference: ORNL/TM-6054. FORTRAN IV; IBM 360.

PSR-147/CERPI-CEREL

A package of codes developed for the automatic analysis of gamma-ray spectra obtained with Ge(Li) detectors was contributed by the Institute of Physics, University of Rome, Italy, and Comitato Nazionale Energia Nucleare, Nuclear Research Institute, Casaccia, Italy. CERPI analyzes complex gamma-ray spectra obtained with Ge(Li) detectors. The significant peaks in the spectrum are detected by observing the behavior of the second derivative function after random variations in counts per channel have been minimized by the application of a smoothing filter function. CEREL does automatic isotope identification on the basis of gamma-ray energy comparison. It contains features such as determination of peak energies and intensities, nuclide identification, and mass computation. References: RT/FI(78)5, RT/FI(78)15, RT/FI(72)14. FORTRAN IV; IBM 360.

CHANGES IN THE DATA LIBRARY COLLECTION

The following changes were made in January.

DLC-71/GAMMON

An activation data library specifically designed for fusion reactor application was contributed by Los Alamos Scientific Laboratory, Los Alamos, NM. The library contains multigroup cross sections (in 100 energy groups) for 420 neutron-induced reactions, multigroup gamma-ray spectra (in 25 energy groups) for 107 unique daughter products, maximum permissible concentrations (MPs) for 200 reaction products, and absorbable decay energy ("sensible heat") for 85 products. The starting point for the GAMMON library was MONTAGE (DLC-33), which contains 100-group neutron cross sections for 421 reactions and, where

applicable, half-lives of the radioactive products. To MONTAGE, GAMMON appends the energy released per disintegration of gamma radiation and of non-gamma radiation in MeV units. For a gamma-ray emitter, the number of photons per 100 disintegrations, in a 25-group structure covering the energy range from 0 to 10 MeV are included. The MPC values are as specified in the Code of Federal Regulations. Included in the DLC-71 package is BIGAMON, a computer code designed to process the GAMMON data. BIGAMON retrieves 100-group, neutron-induced reaction cross sections and 25-group gamma-ray decay spectra from the GAMMON file and bins these data into broader multigroup sets. References: LA-8040-MS and LA-8112-MS. FORTRAN IV; CDC.

DLC-72/MONTUK

MONTUK, an extended version of MONTAGE (DLC-33), contributed by United Kingdom Atomic Energy Authority, Nuclear Physics Division, A.E.R.E., Harwell, contains 100-group neutron activation cross-section data for fusion reactor structure and coolant materials. It provides neutron reaction cross-section data for the energy range from thermal to 15 MeV. It fills needs for high fluence irradiations in which elemental transmutation is a significant factor. The library contains data for 1,010 reactions. MONTUK differs from MONTAGE in that MONTAGE always provides 100 cross-section values whereas MONTUK suppresses those zeros which refer to energies below the reaction threshold; this reduces the number of records in the library from a possible 18,180 to just 6,807. Reference: AERE-R-9601.

VISITORS TO EPIC

The following persons came for an orientation visit and/or to use EPIC facilities during the month of January.

Robert L. Kloster, McDonnell Douglas Astronautics, St. Louis, MO; and Professor Y. Yeivin, Hebrew University, Jerusalem, Israel.

PERSONAL ITEMS

David B. Simpson, former EPIC staff member responsible for the NRC Reactor Safety Research Data Bank Repository, has accepted employment in an engineering section of the Tennessee Valley Authority (TVA), Knoxville, Tennessee.

The following changes of address have been noted: **David Berwald** *from* EXXON Research & Engineering Co., Linden, New Jersey *to* TRW Energy Systems Group, Redondo Beach, CA; and **John F. Lescher** *from* Charles Stark Draper Laboratories, Cambridge, MA *to* Avco Systems Division, Wilmington, MA.

ICRU REPORT ON ABSORBED DOSE IN CLINICAL USE OF RADIONUCLIDES

The International Commission on Radiation Units and Measurements (ICRU) has announced the publication of ICRU Report 32, *Methods of Assessment of Absorbed Dose in Clinical Use of Radionuclides.*

ICRU Report 32 is concerned with methods of evaluating the absorbed dose received by the tissues of persons to whom radiopharmaceuticals are administered. Hitherto, reports of the ICRU have included detailed considerations on the dosimetry of x and gamma ray, neutron and electron beams, for external sources, but not of radionuclides used systemically for medical purposes. The increase in use of radiopharmaceuticals in routine medical diagnosis led the ICRU to undertake the preparation of this report. The procedures, physical data and examples included in the report are intended to provide workers with radiopharmaceuticals with a convenient handbook for use in carrying out such absorbed dose calculations.

Copies of ICRU Report 32 can be purchased for $11.00 from ICRU Publications, P. O. Box 30165, Washington, D.C. 20014, U.S.A.

SYMPOSIUM ON NEUTRON CROSS SECTIONS FROM 10-50 MeV

The *Symposium on Neutron Cross Sections From 10-50 MeV* will be held May 12–14, 1980, at Berkner Hall, Brookhaven National Laboratory, Upton, New York. It was organized under the auspices of the Division of Magnetic Fusion Energy (DMFE) and the Division of Nuclear Physics (DNP) of the U. S. Department of Energy (DOE) and is expected to consider in detail the present state of neutron cross sections in the above energy range. These data are needed for the Fusion Materials Irradiation Test Facility (FMIT) under construction at the Hanford Engineering Development Laboratory (HEDL). Main emphasis of this symposium will be on the energy region above 20 MeV; however, new data and investigations around 14 MeV are welcome. A preliminary agenda of the symposium with 37 review or contributed papers has been distributed. Final agenda will be available in March 1980.

For further information contact National Nuclear Data Center, Brookhaven National Laboratory, Upton, New York 11973; Tel. (516) 345-2902.

UPCOMING AIF CONFERENCES

Nuclear Power and the Public, February 24–27, 1980, Boston, Mass.

Workshop on Licensing and Technical Issues– Post TMI, March 9–12, 1980, Washington, D.C.

Full Cycle Conference '80, April 15–18, 1980, New Orleans, LA. For further information, contact the Atomic Industrial Forum, 7101 Wisconsin Ave., Washington, D.C. 20014.

Short Courses Announced

Radiation Protection, March 10–14, 1980, Anaheim, Calif. For further information contact Engineering Technology, Inc., P. O. Box 9000, Waco, Texas 76710.

Nuclear Power Safety, March 17–21, 1980, Atlanta, Georgia. For further information, contact Department of Continuing Education, Georgia Institute of Technology, Atlanta, Georgia 30332.

DECEMBER ACCESSION OF LITERATURE

The following literature cited has been ordered for review, and that selected as suitable will be placed in the RSIC Information Storage and Retrieval Information System (SARIS). This early announcement is made as a service to the shielding community. Copies of the literature are not distributed by RSIC. They may generally be obtained from the author or from a documentation center such as the National Technical Information Service (NTIS), Department of Commerce, Springfield, Virginia 22151.

RSIC maintains a microfiche file of the literature entered into SARIS, and duplicate copies of out-of-print reports may be available on request. Naturally, we cannot fill requests for literature which is copyrighted (such as books or journal articles) or whose distribution is restricted.

THIS LITERATURE IS ON ORDER. IT IS NOT IN OUR SYSTEM. PLEASE ORDER FROM NTIS OR OTHER AVAILABLE SOURCE AS INDICATED.

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