If things are ever to be moved upward, someone must be ready to take the first step and assume the risk of it. ... William James

ANS/RP&S AWARD TO ENGLE & MYNATT

The American Nuclear Society through the Radiation Protection and Shielding Division presented its award for Technical Achievement to two research staff members of the Oak Ridge National Laboratory (ORNL), Ward W. Engle, Jr. and Fred R. Mynatt, for leadership in solving radiation transport problems and for specific contributions. Their work was performed within the ORNL Engineering Physics (formerly Neutron Physics) Division, which was founded by the late Everett Blizard and now led by Fred C. Maienschein. The Division has always been heavily involved in shielding research and development.

Engle was cited for “his leadership in the development and application of discrete-ordinates methods for solving radiation shielding problems. ANISN, the one-dimensional discrete ordinates code whose development was led by him, remains as surely the most-used shielding code in the world today. He has participated directly in the development of discrete ordinates methods for handling complex problems including two dimensions, time dependence, and other complexities.

“He has been responsible for shielding analysis which has been carried out in support of the design of the FFTF and CRBR. In this analysis he has extended the concept of coupled calculations to the extreme which is required for following the attenuation through the entire shield of a large power reactor. He earlier played a strong role in developing new shielding methods and applying them to solving radiation problems associated with nuclear-powered space vehicles and for the Defense Nuclear Agency. In both cases, the methods have been later widely adapted to other types of shielding situations.

“In addition to his direct contributions, he has made a continued and important impact on the work of others by advising broadly on problems of methods development and application and with regard to the innovative use of modern computing capability.”

The Mynatt citation reads as follows.

“He led in the development of the two-dimensional discrete-ordinates method, DOT, which was designed to be a practical tool for the shielding analyst from the beginning. This user-orientation, together with the high level of sophistication in the development of the method, has led to its worldwide use for two-dimensional calculations.

“He was directly involved in the development of the cooperative roles in the design of fast reactors in which the methods developers in the national laboratories have assisted the designer by specifically tailoring methods to the design needs and applying these methods for a few selected problems which require the maximum analytical capability. This cooperative arrangement appears as a desirable model of interaction between national laboratories and industry.

“His applied analysis group has led many of the innovative developments in the use of discrete-ordinates, Monte-Carlo, coupled methods for combining the above, sensitivity analysis and shield optimization techniques. Applications have been made to a wide variety of civilian and military reactor and weapon systems.

“He has led in the development of the specially designed integral experiments which are required for the validation of analysis methods. Careful preanalysis of the experiments was shown to be necessary in order that the experiments provide a meaningful validation.

“He was chairman of the Radiation Protection and Shielding Division, 1976–1977.”
CURRENT WORK AND PROBLEMS

We continue to report current work and problems as a means of promoting intercommunication between members of the RSIC user community. We encourage our readers to keep us informed and to feel free to communicate, directly or through RSIC, with their peers in areas of interest.

Naoki Yamano, Division of Engineering, Sumitomo Atomic Energy Industries (SAEI), Ltd., Tokyo, Japan, writes that SAEI is a management office of the Sumitomo industry group for research and development in nuclear energy. His division is currently involved in a design study for an FBR fuel reprocessing plant in collaboration with the Power Reactor and Nuclear Fuel Development Corporation.

Dr. Yamano, responsible for shielding design, is currently concerned with methods development. In cooperation with S. Miyasaka, K. Koyama, and T. Asaoka of JAERI, he is engaged in evaluation and in making improvements to the shielding analysis code system, RADHEAT-V4. Its predecessor is packaged in RSIC as CCC 300/RADHEAT V3, A Modular System for the Calculation of Neutron and Gamma-Ray Transport and Energy Deposition in a Nuclear Reactor or Shield, a contribution of the Japan Atomic Energy Research Institute (JAERI).

Dr. Yamano is also involved with T. Miura of the Ship Research Institute in an analysis of circular duct benchmark experiments performed at IRR-4, the JAERI swimming pool type reactor, in which they are using a combination of DOT-DOMINO-MORSE-CG. He is also studying the window and self-shielding effects of neutron cross sections of structural materials (especially iron) for shielding calculations as a part of the work of the Japanese Nuclear Data Committee.

Ulf Tveten, Institutt for Atomenergi, Kjeller, Norway, writes that for some time, he has been diverted from shielding studies for accident analyses performed for the Norwegian Government Committee on Nuclear Power. With the publication of the results of the analyses in a report by that name and summarized in Nuclear Power Safety, NOU 1978: 35c, he hopes to return in a more positive way to his original work.

Professor J. Seda and Dr. Ivo Petr of the Technical University of Prague write that they plan research programs on the interaction of photons and neutrons in several materials. Their immediate interest is the energy deposition of recoil electrons in thin layers from photon interactions.

PERSONAL ITEMS

Bonnie C. Talmi, formerly coordinator of information centers at the Oak Ridge National Laboratory (ORNL), has resigned to manage Oak Ridge Operations of Franklin Research Center, a Division of the Franklin Institute. She will do part-time consulting with the Engineering Physics Information Centers (EPIC), which includes RSIC.

CHANGES OF ADDRESS

We note the following changes of address: J. R. Liaw from University of Oklahoma to Advanced Physics Division, Argonne National Laboratory, Argonne, IL; Roy A. Castelli from Gibbs & Hill, Inc. to Knolls Atomic Power Laboratory, Schenectady, NY; S. L. Bhatia from Allied Chemical Corp., to EG&G Idaho, Idaho Falls, ID; Marco Zaider from Los Alamos Scientific Laboratory to Radiational Research Laboratory, Columbia University, New York, NY; Mercury Vlasov from IAEA Nuclear Data Section, Vienna, Austria, to Institute of Nuclear Research, Ukrainian SSR Academy of Sciences, Kiev, USSR; Thomas M. Jordan (Consultant), from Darnestown, MD, to 814 22nd. St., Santa Monica, CA 90403; and Peter J. Gollon from Fermilab to Brookhaven National Laboratory, Upton, NY.
UNIVERSITY OF TENNESSEE TO OFFER APPLIED MONTE CARLO COURSE

The Nuclear Engineering Department of the University of Tennessee will offer a one-week course in Monte Carlo analysis as a part of Tennessee Industries Week (TIW), September 10-14, 1979. The registration fee is $40, and the deadline for registration is August 24, 1979.

The course is designed specifically for the practicing engineer engaged in shield design and does not presume any prior knowledge of Monte Carlo methods. An understanding of the theoretical basis of Monte Carlo methods will be emphasized along with their specialized applications to practical shielding problems. The versatile Monte Carlo code, MORSE, will be described. Special attention will be given to the understanding and use of the ALBEDO option. Application of the appropriate Monte Carlo code and/or the cross-section data for your job will also be discussed.

Additional information on this and other courses offered during TIW can be obtained from F. N. Peebles, Dean of Engineering, or P. N. Stevens, Professor of Nuclear Engineering, UTK College of Engineering, 124 Perkins Hall, Knoxville, TN 37916 (615-974-5321).

RENSSELAER ANNOUNCES COURSES

The Office of Continuing Studies of Rensselaer Polytechnic Institute announces its summer programs in Nuclear Reactor Design and Basic Nuclear Technology as follows: July 9-13 — Basic Nuclear Reactor Technology; July 16-20 — Nuclear Reactor Design; and July 23-27 — Computer Applications and Reactor Design Codes.

The program is intended primarily for nuclear industry and utility power company engineers and managerial and technical staff personnel as well as educators desiring a review of the background material and the methods and procedures involved in the analysis and design of current nuclear power reactor systems. It will also be useful to the practicing engineer interested in improving his background in nuclear technology, reactor design or computer applications. A number of important topics in reactor engineering and design will be covered in depth, starting from the fundamentals of nuclear reactor technology to the state-of-the-art techniques and methods used in the integrated design analysis and evaluation of nuclear power plants, including computational approaches and methods, safety and fuel management. Computer programs and reactor design code packages typical of those in current use in the nuclear industry will be discussed and their operation demonstrated on the IBM 3033 computer and an up-to-date interactive computer graphics system at RPI.

The overall program will comprise three separate, self-contained one-week course modules, organized and structured in a manner so as to permit adequate flexibility and optimum usefulness. Any one course module can be taken separately and independently—or all three sequentially. No special preparation in nuclear science is required for the course, although it would be helpful for the participants to have adequate background in basic technical areas.

Topics to be covered include the following.

Basic Nuclear Reactor Technology: Reactor Physics & Engineering Fundamentals; Nuclear Power Systems, Reactor Types; Nuclear Energy Conversion and Heat Transport; Systems Analysis of Nuclear Power Plants; Safety and Health Physics, Licensing; and Use and Operation of the Rensselaer Reactor.

Nuclear Reactor Design: Design Considerations: Approaches and Methods; Nuclear Design; Thermal-Hydraulic Design; LWR Safety and Related Design Requirements; Nuclear Power Quality Assurance; Fuel Management; and Nuclear Power & Electric Utility Economics.


For additional information, contact Office of Continuing Studies, Rensselaer Polytechnic Institute, Troy, New York 12181.
UPCOMING MEETINGS

We call attention to the following upcoming meetings which have not been previously announced in this newsletter.

August 1979


September 1979


October 1979


April 1980

*Nuclear Criticality Safety ANS National Topical Meeting.* April 8-10, 1980, El Paso, Texas. Contact: Thomas P. McLaughlin, P. O. Box 1663/MS-560, Los Alamos, NM 87545.


December 1980

*Topical Meeting on Atomic and Nuclear Methods in Fossil Energy Research.* December 1-4, 1980, Mayaguez, Puerto Rico. Contact: Dr. Royston Filby, Nuclear Radiation Center, Washington State University, Pullman, WA 99163.

CHANGES IN THE COMPUTER CODE COLLECTION

The following changes were made in June.

**CCC-345/SEDONE**

SEDONE, a simulator of fast-transient, one-dimensional hydrodynamic and three-layer, variable-size sediment concentration conditions in controlled rivers and tidal estuaries, is particularly designed for application to site-specific problems that require accurate predictions of the sedimentation phenomena under severely reversing flow conditions. It is a contribution of UCC-ND Computer Sciences Division, Oak Ridge National Laboratory. Reference: ORNL/NUREG/TM-256. FORTRAN IV; IBM 360.

**CCC-347/REDIFFUSION**

REDIFFUSION, a one-dimensional neutron and gamma-ray shield penetration code system was contributed by The Reactor Physics Division, Atomic Energy Establishment Winfrith, Dorchester, Dorset, England through the OECD NEA Data Bank, Gif-sur-Yvette, France. For neutrons the removal-diffusion method is used. For gamma-rays there is the option of using either kernel integration with buildup factors or diffusion theory with a first-flight correction. Linked calculations are possible in which the gamma-ray sources are calculated from the neutron fluxes. References: AEEW-R-818, -819, -825, -826, -827, -828, -834, -836, -848, -849, -1157, -1158, -1159, -1160. FORTRAN IV; IBM 370.
PSR-139/SIOB

SIOB, a code for least-squares shape fitting of several neutron transmission measurements using the Breit-Wigner multilevel formula, was contributed by Oak Ridge National Laboratory. Any number of measurements on a common energy scale for different sample thicknesses can be simultaneously fitted. The computed transmission curves can be broadened with either a Gaussian or a rectangular resolution function or both, with the resolution width a function of energy. Reference: ORNL/TM-6286, ENDF-261. FORTRAN IV; IBM 360.

CHANGES IN THE DATA LIBRARY COLLECTION

The following changes were made during June.

DLC-2/100G

DLC-2, the 100-neutron group cross-section library has been updated with the addition of a data set for iodine, contributed by Oak Ridge National Laboratory. All other data were unchanged. The new code package is denoted DLC-2G. To obtain the iodine alone, or the total package, one should submit a single reel of magnetic tape.

DLC-41/VITAMIN-C

The 171-neutron, 36-gamma-ray group cross-section library in AMPX master format has been updated by reprocessing some data sets and adding new ones to the current library. The updated library is designated DLC-41C/VITAMIN-C. Material for the update is a contribution of the Engineering Physics and Computer Sciences Divisions, Oak Ridge National Laboratory. Much input for the update came as a result of participation in the CSEWG data testing program by ORNL and other installations. User feedback from Sandia, General Electric-Sunnyvale, Princeton Plasma Physics Laboratory, Westinghouse Fusion Power Systems, Texas A&M, and other installations was helpful in developing this update.

New data include neutron cross sections for Gd, $^{149}$Sm, $^{233}$Pa, $^{241}$Am and $^{243}$Cm and new photon interaction cross sections from Gd and Sm. Neutron cross sections for $^{234}$U, $^{238}$U, and $^{242}$Pu were rerun with a revised prescription for coating the unresolved energy mesh ($\Delta u = 0.05$ rather than $\Delta = 0.5$). Neutron cross sections for $^{240}$Pu were regenerated with refinement in the quadrature for the fluctuation integrals associated with the unresolved resonance calculation. For $^{11}$B, a rerun was made to include secondary neutrons produced by $(n,2n)$ and continuum inelastic scattering. A rerun was made for $^{16}$O with an improvement in the linearization process to correct a problem with the capture reaction. The hydrogen data were modified by inserting bound-in-water values for the thermal groups into the infinitely dilute cross sections associated with the Bondarenko part of the file. The previous version had bound-in-water values only for the 1D and 2D AMPX data, and if the hydrogen were run through BONAMI, these data would be replaced by self-shielded but unbound values.

Finally a new version of the entire gamma-ray production library was run with a linearized and correctly normalized pointwise weighting functions.

The two sample problems were run to test the effect of the changed data sets, and differences in results are, in general, minor. The form of the library is modified slightly so that neutron cross-section data are divided into 3 files. One file contains 21 materials (includes all materials which were rerun except $^{11}$B) including all that are used in the DLC-41 sample problems. Another contains 20 materials (includes 5 new materials plus H and $^{11}$B). The third contains 25 materials and is the same as that for DLC-41B.

A total of six full reels (2400 ft.) of magnetic tape are required to transmit the entire library. IBM 360/91.
DLC-44/CoverX

The compilation of multigroup covariance matrices has been updated with the addition of a 26-neutron energy group set for fast reactor benchmarks, contributed by the Oak Ridge National Laboratory. Covariances are included for $^{235}\text{U}$, $^{238}\text{U}$, $^{239}\text{Pu}$, $^{240}\text{Pu}$, $^{241}\text{Pu}$, Na, Fe, N, O, and C based on evaluated covariance files from ENDF/B-IV and private communication. The data can be retrieved and utilized by the FORSS (CCC-334) system, in particular the COVERT and CAVALIER modules. The new package is designated DLC-44B/CoverX. A single reel of magnetic tape is needed for transmittal. Reference: ORNL-5318. IBM 360.

DLC-57/Sail

A 37-neutron, 21-gamma-ray group albedo data library generated using 1-1/2-D DOT with DLC-31/FEWG1 cross sections processed from ENDF/B-IV library, was contributed by Science Applications, Inc., La Jolla, California, and Electric Power Research Institute (EPRI), Palo Alto, California. Data for two types of materials, ordinary concrete and low carbon steel, are included. Also included is a utility code for reducing the number of groups. The albedo data can be utilized in a Monte Carlo procedure such as BREESE in MORSE. Reference: SAI-013-79-525-I. FORTRAN IV; IBM 370.

DLC-65/ESG

The 56-group cross-section library based on VITAMIN C, generated by using SPHINX and XSDRNP to collapse 171 groups, was contributed by Rockwell International, Canoga Park, California, and UCC ND Computer Sciences Division, Oak Ridge National Laboratory. Reference: Informal Notes. IBM 360.

Tapes Required for DLC-59/CAD Requests

DLC-59/CAD, the 51-neutron, 25-gamma-ray group ALBEDO DATA generated with DOT for various materials, contains 361,000 records for each of 4 materials (total 1,444,000 records). Two 2400 ft. reels of magnetic tape should accompany each request for the library written at 6250 bpi. Four reels should accompany requests to be written at 1600 bpi and 8 reels for 800 bpi. All of the above are for 9-track tapes.

June 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.

Reactor and Weapons Radiation Shielding Literature


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CONF-780921, pp.7-27, Nuclear Data for Reactor Design, Operation and Safety, Rowlands, J.L., September 1978, OECD, 2, rue André-Pascal, 75775 PARIS CEDEX 16, France

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Physics Data-Nr.13-1, Evaluation of the Cross-Sections for the Reactions $^{24}$Mg (n,p) $^{24}$Na, $^{65}$Zn (n,p) $^{65}$Cu, $^{64}$Cu (n,2n) $^{63}$Cu and $^{90}$Zr (n,2n) $^{90}$Zr., Tagesen, S.; Vonach, H.; Strohmaier, B., 1979, ISSN 0344-8401

REG/G-1.112(5-77), Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors., Nuclear Regulatory Commission, April 1976, NUREG, Washington, D.C.


UWFDM-288, Tokamak Reactors and Structural Materials., Conn, R.W., January 1979, Nuclear Engineering Department, University of Wisconsin, Madison, WI 53706


Atomic Data and Nucl. Data Tables, 22(2), 109-123, The Internal Conversion Coefficients of the 2-0, E2 Nuclear Transitions in Even-Even Nuclei., Mladjenovic, M.; Zupanic, M.; Vukanovic, R., August 1978


Nucl. Sci. Eng., 70(2), 210-212, Optimum Biasing of Integral Equations in Monte Carlo Calculations., Hoogenboom, J.E., May 1979