RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION CARBIDE CORPORATION FOR THE U.S. DEPARTMENT OF ENERGY

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No. 180 *December 1979*

It is impossible to make anything foolproof because fools are so ingeneous. . . .
Anon. (from David T. Goldman's blackboard (NBS))

SEMINAR-WORKSHOP QUERY

Your attention is called to the article (page 1) and the form (last page) of the November 1979 (No. 179) issue of the *RSIC Newsletter* in which we publicized the April 21–23, 1980 Seminar-Workshop on "Theory and Application of Monte Carlo Methods." If you are interested in attending, and if you wish to participate in the seminar program, we remind you to fill out and mail to us the form, or contact us in writing or by telephone (615-574-6176 or FTS 624-6176) as soon as you can conveniently do so.

A NOTE TO OUR CONTRIBUTORS

Appended to this issue of the newsletter is a form which delineates in detail the information we need to successfully retrieve computerized information supplied by you to our center. The inclusion of this information with the tape transmittal of computing technology (codes or data) will be cost effective in time savings for both the contributor and our center.

Please note that we ask for the name of the institutional contributor to be credited, and also for the name and telephone number of the individual responsible for interacting with RSIC during the packaging process and for reviewing significant feedback from use at other institutions.

We suggest that you duplicate the form for use in any code or data transmittal to RSIC. As always, we appreciate your efforts to keep RSIC effective in serving its user community.

RSIC INFORMATION SYSTEM ENHANCED

The RSIC computer-based literature storage and retrieval information system (SARIS), started in 1962, has recently been significantly modified. Originally established on IBM computers as a unique local RSIC system, SARIS now uses ORNL/ORCHIS programs to maintain the master file and perform on-line searches using the ORNL IBM 370/3033 computers. The new system, using DOE/RECON for on-line searches, provides the following advantages:

1. Faster turn-around for literature searches.
2. More up-to-date files.
3. Searches of the entire file (8285 literature entries at present) by author or title words.
4. Searches of the indexed literature by RSIC subject category number, category number with emphasis levels, or keywords.
5. Text searches of the entire file (LOOK command) in the title and abstract fields.
6. On-line access to the RSIC RECON data bases by all DOE/RECON users.

Additional information on the RSIC data bases is available upon request. Persons wanting information about authorization to tie into the DOE/RECON system should address their requests to: Chief, Customer Services Branch, Technical Information Center, U.S. Department of Energy, P. O. Box 62, Oak Ridge, Tennessee 37830. Persons who are not able to access DOE/RECON may continue to make their requests for literature searches directly to RSIC, ORNL/EPIC/6025, P. O. Box X, Oak Ridge, TN 37830.

NEW AMERICAN NATIONAL STANDARD PUBLISHED BY ANS

An American National Standard entitled "Guidelines for Considering User Needs in Computer Program Development," ANSI/ANS-10.5-1979, was approved by the American National Standards Institute, Inc. (ANSI) on August 29, 1979 and has been published and is being made available by the American Nuclear Society, 555 North Kensington Avenue, La Grange Park, Illinois 60525 USA. Price $12.00.

As a guideline, the standard recommends programming and documentation practices that are important for accommodating user needs. It is one of three documents directed towards individuals who develop computer programs. The other two are "Recommended Programming Practices to Facilitate the Interchange of Digital Computer Programs," ANS-Std.3-1971, and "American National Standard Guidelines for the Documentation of Digital Computer Programs," N413-1974 (ANS-10.3). Proper application of the above standards will improve the design and utility of computer programs by encouraging the developer to consider aspects related to user requirements which are often overlooked or assigned a low priority.

These guidelines were prepared by the ANS-10 Subcommittee of the ANS Standards Committee, which is sponsored by the ANS Mathematics and Computation Division. An RSIC staff member has been a member of ANS-10 since its inception in order to support efforts to facilitate the exchangeability of scientific computing technology in RSIC's subject field.

ANS RP&S. DIVISION NEWS

Richard K. (Kep) Disney of Westinghouse, Program Committee Chairman, has announced that special sessions of the Radiation Protection & Shielding Division are planned for the 1980 National Meeting in Las Vegas as follows: Personnel Neutron Dosimetry, Neutron Irradiation Damage—Its Prediction and Interpretation, and a TMI-2 related session. The division will also co-sponsor the ANS Topical Meeting at Sun Valley, Idaho reported in this issue of the newsletter.

NUCLEAR MODEL CODE INTERCOMPARISON

During 1977 and 1978 a series of nuclear model code comparisons were made by the Nuclear Model Codes Subcommittee of the Cross-Section Evaluation Working Group under the chairmanship of A. Prince (BNL), resulting in a significant improvement in agreement for calculations of total, elastic, inelastic, capture and threshold reaction cross sections for the six codes of U.S. origin considered. An extension of the study to include codes of European and Japanese origin, with the collaboration of the Nuclear Energy Agency (NEA), Nuclear Data Committee (NDC), and the NEA Data Bank (DB) was suggested. The aim of the study is intercomparison of cross-section calculations made with various nuclear model codes, not primarily to achieve better agreement with experimental data, but to pinpoint error and deficiencies in codes and to create confidence in code calculations where experimental data is non-existent.

The initial study concentrated on comparison of cross-section calculations for ^{59}Co reactions in the neutron energy range up to 20 MeV. A further study including the fission channel is proposed for fertile and fissile nuclei, possibly ^{232}Th and ^{233}U. There is also interest in investigating charged-particle producing reactions in the 20-50 MeV region for cross sections and energy and angular distributions. Particular interest will be given to the pre-equilibrium phase, and to coupled channel codes.

Anyone interested in participating in this comparative study should contact Dr. Enrico Sartori, NEA Data Bank, B.P. 9, F 91190, Gif-sur-Yvette, France.

NEW PUBLICATION OFFERS COMPREHENSIVE WORLDWIDE ENERGY INFORMATION

Business Information Display, Inc. announced on November 1 the first issue of *WORLD ENERGY INDUSTRY*, a statistical reference publication containing over 400 pages of comprehensive tables and graphs. A compendium of information for 50 countries, *WORLD ENERGY INDUSTRY* collects energy commodity statistics from authoritative

primary data sources around the world, and presents them to the user in tables and colorful graphs via an integrated computer data-base management and publishing system. Each volume is divided into five main sections, progressing from an "executive overview" of key graphs for the quarter to regional energy totals, special-interest organizations (OPEC, EEC, OECD), breakdowns by individual countries, and to groupings by energy commodity and function (production, reserves, prices, etc.). Timely information about regions, countries, and organizations is logically organized in a standard energy balance format, allowing easy comparison between areas. Related macroeconomic data (such as GNP, industrial production, trade balances) are also included for each country. Commodity sections–petroleum, coal, nuclear, etc.–are broken down by function, listing respective countries.

Data in *WORLD ENERGY INDUSTRY* are converted to common units of measure for quick interpretation by subscribers in any country. Tables in English, metric, and heat equivalents with corresponding graphs make inter-country and inter-commodity comparisons easy.

The first issue of *WORLD ENERGY INDUSTRY,* containing 2nd quarter 1979 data, was available in November, with updated issues published quarterly. The annual subscription rate is $450.00.

For further information, contact William Liscom, Business Information Display, Inc., 4202 Sorrento Valley Blvd., San Diego, CA 92121, U.S.A. Telephone (714) 452-7675.

NEW IAEA NUCLEAR DATA NEWSLETTER ISSUED

The Nuclear Data Section (NDS) of the International Atomic Energy Agency (IAEA) initiated publication of *Nuclear Data Newsletter* with its Issue No. 1, September 1979, created to improve the flow of nuclear data information from the IAEA Nuclear Data Center to the continuously increasing number of its customers. This Newsletter is planned to be issued as required at irregular intervals. The Newsletter will contain news on CINDA, EXFOR, and the status of existing and new nuclear data files and libraries, as well as titles of new nuclear data reports published or received by the Nuclear Data Section.

Until recently, NDS has advertised the availability of nuclear data files through the CINDU catalogue whose function was to describe the contents and formats of nuclear data files available from NDS. With the ceasing of the CINDU publication, its function will be assumed by a new report series entitled "IAEA Nuclear Data Services"(IAEA-NDS-...). Each of these reports will contain the format and content description of a nuclear file available from the IAEA Nuclear Data Section, and will be announced in the *Nuclear Data Newsletter.* Thus all nuclear data files available from NDS will be documented in the IAEA-NDS report series, which will be available on request from the Nuclear Data Section.

Further information on these or other matters may be secured by writing to the new address: Nuclear Data Section, International Atomic Energy Agency, P. O. Box 100, A-1400 Vienna, Austria.

NUCLEAR STANDARDS NEWS

The following newly published standards may be ordered from ANS.

ANSI/ANS-5.1-1979—Decay Heat Power in Light Water Reactors, price: $25.00.

ANSI/ANS-10.5-1979—Guidelines for Considering User Needs in Computer Program Development, price:$12.00

5TH IRPA CONGRESS TO MEET IN JERUSALEM

The International Radiation Protection Association (IRPA) has announced plans for its 5th Congress to be held in Jerusalem, Israel, March 9–14, 1980, with the Israel Health Physics Society as host. This Congress follows successful IRPA Congresses held in Rome, Italy (1966), in Brighton, U.K., (1970), in Washington, D.C., U.S.A., (1973), and in Paris, France, (1977).

The scientific program is planned to cover all aspects of radiation protection with emphasis on its central theme, "Radiation Protection—A Systematic Approach to Safety." Nine formal sessions will cover: The Sievert Lecture, Occupational Exposure, Environmental Modelling and Dose Assessment, Patient Exposure and Radiotherapy, Radioactive Releases and Environmental Monitoring, Assessment of Risk, Dose Equivalent, Dosimetry, Applied Radiation Protection, Ethical and Legal Aspects, Radiobiology, Atmospheric Dispersion and Aerosol Behavior, Internal Contamination from Pu and other Transuranics, Radiological Aspects of the TMI Accident, Emergency Planning,

Biological Effects of Environmental Radiation, Instrumentation and Shielding, Justification and Optimization, Radiation Protection Standards, Internal Dosimetry, Measurement Techniques, Regulatory Aspects, Waste Disposal, Radiological and Industrial Hygiene, Non-Ionizing Radiation, Applied Radiation Protection, Internal Contamination and Radiobiology, Fate of Radionuclides in the Environment, A Review of Activities of International Organizations in Radiation Protection, and A Review of Activities of the BEIR Committee and IRPA's NIR Committee.

The Congress sessions will be held at the Jerusalem Hilton Hotel. Pre- and Post-Congress workshops, to be held in kibbutz or rural settlement guest houses, are arranged as follows:

PRE-CONGRESS WORKSHOPS (March 6–8)—Justification and Optimization in Radiation Protection and Internal Dose calculations; **POST-CONGRESS WORKSHOPS** (March 17–19)—Non-Ionizing Radiation, Radiobiology–New Trends, Radiation Protection in Uranium Industries, Emergency Planning for Nuclear Facilities, Waste Disposal and Public Safety, Risk Evaluation of Low Level Radiation Exposures, and Operation Approaches in Medical Departments of Nuclear Research Centers.

Registration forms and detailed information concerning Congress, Workshops, and tours may be secured from The Secretariat—IRPA 5th International Congress, P. O. Box 16271, Tel Aviv, Israel.

1980 FUSION TOPICAL MEETING

Plans have been made for the 4th ANS Topical Meeting on the Technology of Controlled Nuclear Fusion to be held October 14–17, 1980 at the Sheraton Valley Forge Hotel, King of Prussia, PA, sponsored by the Delaware Valley Section and Controlled Nuclear Fusion Division of the ANS, Princeton Plasma Physics Laboratory, Department of Energy, and the Electric Power Research Institute under General Chairman R. G. Mills. The meeting will embrace three days of invited talks and poster papers, plus a tour of PPPL on the fourth day. The theme of the meeting is "Fusion Technology Moves Towards the Reactor Phase."

The call for papers is planned for January.

CALL FOR PAPERS FOR 1980 RP&S CONFERENCE

A **call for papers** has been issued for a conference on "1980 Advances in Reactor Physics & Shielding" to be held on September 14–17, 1980 in Sun Valley, Idaho, sponsored by the ANS Reactor Physics Division, the ANS Radiation Protection and Shielding Division, and the Eastern Idaho Section. Dual objectives of the meeting are to review internationally the current status of reactor physics and shielding, as well as offer an opportunity for presentation of significant new work. Both thermal and fast reactors will be included.

Papers are solicited in the areas of status of reactor physics and shielding; safety-related physics; impact of operational experience on reactor design; new developments in physics and shielding; physics of reactor design; current problems in shielding, and cross sections and methodology in physics and shielding. Deadline for 900-word summaries: March 15, 1980. Final paper deadline: September 1, 1980.

Send summaries to: Michael J. Lineberry, Technical Program Chairman, Argonne National Laboratory, P. O. Box 2528, Idaho Falls, Idaho 83401 (Phone 208-526-7434).

UPCOMING MEETINGS

We call attention to the following upcoming meetings.

January 1980

Workshop on Radiation Spectrometry and Unfolding Techniques, January 8–10, 1980, Kalpakkam, Tamil Nadu, India. Contact: A. Natarajan, Secretary, Safety Research Laboratory, Reactor Research Centre, Kalpakkam, 603 102, India.

March 1980

Nuclear Power Safety, March 17–21, 1980, Georgia Institute of Technology, Atlanta, Georgia. Contact: Director, Department of Continuing Education, Georgia Institute of Technology, Atlanta, Georgia 30332; Telephone: 404-894-2400.

April 1980

Second International Conference on Emerging Nuclear Energy Systems, April 8–11, 1980, Lausanne, Switzerland.

Contact: Dr. Sümer Sahin, Ecole Polytechnique Fédérale de Lausanne, Laboratoire de Génie Atomique, 33, Av. de Cour, CH-1007 Lausanne, Switzerland.

ANS National Topical Meeting on Nuclear Criticality Safety, April 8–10, 1980, El Paso, Texas. Contact: David R. Smith, P. O. Box 1663, MS 560, Los Alamos, NM 87545.

ANS National Topical Meeting on Thermal Reactor Safety, April 8–11, 1980, Knoxville, Tennessee. Contact: William B. Cottrell, ORNL, P. O. Box Y, Oak Ridge, Tenn. 37830.

PERSONAL ITEMS

We have been informed of the death on September 28 of **Bertrand J. Dreyfus** of the CODATA Secretariat, Paris, France. Several RSIC participants were privileged to know and work with him on various CODATA activities from which he will be missed.

L. John Perkins has left the University of Birmingham (UK) to accept a position with IRT. His current address is IRT Corporation, 7650 Convoy Court, P. O. Box 80817, San Diego, CA 92138 (Telephone: 714-565-7171).

Sid Fernbach, 17-year leader of Theoretical Physics and Computation divisions at Lawrence Livermore Laboratory has retired after 27 years of service. An RSIC friend and supporter, Fernbach led in efforts to promote the effective use of computers in the nuclear industry. He founded the *Journal of Computational Physics* and wrote a series of reference books in the field. Under his leadership, LLL added the IBM STRETCH, the CDC 6600, 7600 and STAR to its collection of advanced computers. He will continue to serve LLL as a consultant.

The following address changes have been noted: **Mike Stamatelatos** *from* JAYCOR *to* General Atomic Company, San Diego, CA; **Leona Stewart** *from* Los Alamos Scientific Laboratory, *to* Oak Ridge National Laboratory, Oak Ridge, TN; **Robert T. McGrath** *from* the University of Michigan *to* EXXON Research & Engineering, Lindes, NJ; **Terry Stupar** *from* the University of Cincinnati Radioisotope Laboratory, Cincinnati General Hospital *to* University of California Radiation Oncology, San Francisco, CA; **Ronald G. Peterson** *from* General Electric Co., Philadelphia, PA *to* Physics International Co., San Leandro, CA; and **William L. Dunn** *from* N.C. State University *to* Research Triangle Institute, Operations Analysis Division, Research Triangle Park, NC.

VISITORS TO EPIC

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

Mark Fortsch, Fluor Engineers & Constructors, Irvine, CA; Helen Pfuderer, Information Division, Oak Ridge National Laboratory, Oak Ridge, TN; S. J. Senatore, Ebasco Services Co., New York City, NY; Sümer Sahin, Ecole Polytechnique Fédérale de Lausanne, Switzerland; and Robert Wagner, Engineering Division, Oak Ridge National Laboratory, Oak Ridge, TN.

CURRENT WORK AND PROBLEMS

The following is a summary of reactor physics activities at the **Institut für Kernenergetik und Energiesysteme, University of Stuttgart, FR Germany.**

1. *Coupling of diffusion- and transport-solutions in two-dimensional response matrix calculations*, W. Bernnat and G. Sibiya.

   For two-dimensional problems, such as the 2-D IAEA Benchmark problem, the response matrix method (RMM) provides a highly accurate and fast means for solving the diffusion equation, when at most a linear distribution for the spatial currents at the mode faces is assumed. However, not only the solution of the diffusion equation is possible by this method, but also that of the transport equation for some nodes within the reactor

provided a suitable coupling scheme is adopted for the relevant nodes. We have recently applied this coupled diffusion-transport method in the calculation of k and the flux distribution in BWR fuel elements, such as the NEACRP Fuel Bundle Benchmark, for instance. For this problem, the treatment of the region comprising the water gap and the cruciform control rod is not possible by means of diffusion theory. Instead we treated the region using suitable response matrices calculated from a Monte Carlo transport method (Program HRMC). The rest of the fuel element (homogenized fuel rods) are treated by means of response matrices calculated by diffusion theory (Program D2F). The numerical solution of the current equations using both types of response matrices is carried out by the program INNER.

The results show execeptionally good agreement with those obtained from two-dimensional TWOTRAN calculations. Moreover, the computing time for the RMM is much less compared to that required by the S_N Method. For different fuel loadings, much computing time can naturally be saved since the response matrix for the transport region need not be recalculated each time.

2. *A-posteriori evaluations of the sparse grid calculation results in BWR-dynamics*, J. Elzmann and M. Havranek.

The computer code system LUPE-COBRA is applied for a-posteriori analysis of a coarse-mesh core calculation result. In particular, the original heterogeneous structure of the fuel bundle can be considered. Using the code, the following phenomena were studied: a) The influence of control-rod withdrawal in the local flux peaks. The following quantities are the physical parameters: the control-rod withdrawal height, the control-rod withdrawal speed, and burn-up in the environment of the topmost end of the control-rod. b) The influence of changes in the coolant circulation during BWR operation.

3. *Multidimensional kinetics calculations with the Finite Element Method,* F. Schmidt and R. Fremd.

The Finite Element Program DIFGEN solves the two and three dimensional multigroup neutron diffusion equation. This program was installed at several German installations and used to do various kinds of static calculations. An option was included which allows the use of curved elements.

An alternative direction explicit method was developed. With this method DIFGEN may be used for transient diffusion and heat transfer calculations in arbitrary geometries. The method was applied to the TWIGL problems and to the ANL r-z kinetics benchmark. Reasonable agreement could be found. Most important, however, is the fact that with the new method transient finite element calculations can be done in computer times which are only known from transient nodal programs.

Thus the Finite Element Method may now be used as a valuable tool in reactor physics.

4. *Prediction of neutron embrittlement in reactor pressure vessel—progress report*, G. Hehn, G. Prillinger, A. Fischer, and K. Al-Mallah.

Within the German research project, "structural integrity of reactor components," precise neutron spectrum calculations were performed in the irradiation rigs of the material testing reactors DIDO and MERLIN of KFA-Jlich and GKSS-Geesthacht as well as for the power reactor VAK at Kahl, where various test specimens of pessure vessel material are irradiated under different neutron environments but otherwise identical conditions. The calculated spectra will be checked by foil detector measurements and will serve then as a basical information for damage function unfolding with the programs RFSP-JUL and STAY'SL.

Since the variation of the neutron spectrum available for irradiation tests is somehow restricted, most of the damage is produced by neutrons in the upper keV- or lower MeV-energy regions. A better guess function is needed for higher and lower neutron energies to compensate the insufficiency of the unfolding procedure. Accordingly our second activity is directed to improve the guess function needed. Normally one starts with the atomic displacement cross section as a measure of the primary damage processes. We developed a procedure to improve the guess function by differentiating the primary damage processes according to different cascade energies. The cascade energy provides a better correlation basis to the complicated annealing processes than the neutron energy does.

A third activity comprises improvements of neutron fluence and spectra determination in light-water power reactors at the positions of surveillance capsules as well as at the local points of maximum damage production in the pressure vessel, showing the real demands of damage correlation needed.

5. *Flow of radioactive gases through soils in three dimensions*, A. Dinkelacker.

A hypothetical accident in an underground nuclear power plant might cause radioactive gases to be released into the surrounding soil. To investigate the spreading of these gases within and through the soil, a physical model has been developed. This model features one- and two-component flow of ideal gases through inhomogeneous porous

media on the basis of Darcy's law. The flow is assumed to be isothermal. The model also includes the simulation of radioactive tracer particles moving along with the flow.

Based on this model a computer code, called FLOG3D, has been developed. This code enables the user to calculate transient pressure and concentration distributions in inhomogeneous porous media with cavities, as well as the location of radioactive tracer-particles and retention times. These calculations can be done in one to three dimensions using Cartesian geometry.

To solve the model equations numerically a special coarse mesh method has been employed. In this method special interpolation polynomials are used to approximate the solution within the meshes.

To verify the FLOG3D code, several test runs have been made. The numerical results showed good agreement with experimental and analytical results.

6. *Neutron diffraction experiments*, G. Schleussner.

Our equipment is a 4 MeV Dynamitron accelerator which is used among other things for neutron diffraction experiments. Actually we are investigating cross sections of uranium 238 and lanthanum. Experimental data are analyzed with the program FERDOR. In the future it is planned to use the program JUPITOR for further calculations.

CHANGES IN THE COMPUTER CODE COLLECTION

The following changes were made in November.

CCC-187/SAM-CE

The SAM-CE Monte Carlo time-dependent three-dimensional complex (combinatorial) geometry code system for neutron, gamma-ray, and electron transport calculations was updated to replace SAM-F (forward Monte Carlo Method) with a newly modified and extended version designated SAM-F, Revision 7. The new developments are a contribution of Mathematical Applications Group (MAGI), Elmsford, New York and the Electric Power Research Institute (EPRI), Palo Alto, California. SAM-CE was originally designed by MAGI for neutron and gamma-ray shielding calculations and the system retains this capability. Through Revision 7 the following features were added: (1) capability of doing eigenvalue calculations in multiplying media; (2) capability of tracking particles in the thermal energy region; (3) more efficient representation of the unresolved resonance energy range based on the utlilization of probability tables; and (4) capability of processing and utilizing the extremely large nuclear data tables obtained when the resolved resonance data of heavy nuclei (such as ^{238}U) is reduced to a point-tabular form. Reference EPRI CCM-8. FORTRAN IV; CDC-6600.

CCC-353/SNEX

SNEX, a one-dimensional spatial single group (plane, cylinder, sphere) discrete ordinates transport code system was contributed by Los Alamos Scientific Laboratory, Los Alamos, New Mexico. Structured closely to ONETRAN (CCC-266) in input/output formats, SNEX provides a semianalytic solution of the one-dimensional discrete ordinates transport equations with diamond-differenced angular fluxes including both standard diamond and step-starting schemes as options. Its purposes are to provide a standard for comparisons of spatial differencing schemes as well as an exact numerical solution to the discrete ordinates equations in one-dimensional geometries. Reference: LA-7879-MS. FORTRAN IV; CDC.

CCC-355/PREST

An analog model and code system, contributed by European Atomic Energy Community (EURATOM) through the NEA Data Bank, Gif-sur-Yvette, France, is designed for containment studies following a LOCA and for internal dose calculations due to radioactive iodine released outside the containment building. Allowance is made for both the blowdown phase of the primary coolant and the subsequent phase of the accident to be studied. In order to determine the heat exchange with structures inside the containment building as well as with the outside atmosphere, the structures are treated in slab geometry. Reference: EUR 3927e. FORTRAN IV; IBM 360.

CCC-356/PLUMEX

A code system for the evaluation of external gamma-ray exposure due to a Gaussian plume by point kernel integration was contributed by Tokai Works, Power Reactor and Nuclear Fuel Development Corporation, Tokai-mura, Ibaraki-ken, Japan. PLUMEX, handling a range of photon energy from 0.01 to 3.0 MeV, calculates external exposures by photons emitted from a radioactive plume at any point in a half-space above the ground surface. The gaseous radioactive effluent released into the atmosphere is assumed to have a concentration distribution represented by a Gaussian plume, which is considered to be the source of photons in the dose calculation. Reference: PNCT 843-79-16. FORTRAN IV; IBM 360.

CCC-358/SOFIP

SOFIP, developed to evaluate the space radiation environment encountered by geocentric satellites, was contributed by NASA Goddard Space Flight Center, Greenbelt, Maryland. It produces, for a given input trajectory, a composite integral orbit spectrum of either protons or electrons. Additional features such as running printout, exposure index, peaks per orbit, percent time in electron trapping zones, differential spectrum, solar proton fluences, and punched output are available separately or in any combination. References: NSSDS-72-12, -75-11, -76-01, -77-04, -76-06. FORTRAN IV; IBM 360.

CCC-359/MAGIK

A Monte Carlo code system for computing induced residual activation dose rates was contributed by the Oak Ridge National Laboratory. MAGIK calculates the time-independent photon dose rates that result from activities produced by nucleon-nucleus and meson-nucleus collisions over a wide range of energies. The system has been used both for high-energy accelerator studies and for fusion reactor studies. Reference: ORNL-5561. FORTRAN IV; IBM 360.

CCC-360/AIRDIF

A two-dimensional atmospheric radiation diffusion code system was contributed by the US Air Force Weapons Laboratory, Kirtland AFB, New Mexico. It employs a special form of diffusion theory to compute free field radiation environments from atmospheric nuclear detonations. The code system may be run in either homogeneous air or two-dimensional variable density air. In addition to environments, AIRDIF is also capable of computing K-Factors, defined to be the ratio of the two-dimensional $4\pi r^2$ variable density air dose to the one-dimensional mass integral scaled dose, for a particular source, dose response function, and at a number of mass ranges. Reference: AFWL-TR-77-29. FORTRAN IV; CDC 6600/7600.

CCC-361/SANDYL

A Monte Carlo three-dimensional code system for calculating combined photon-electron transport in complex systems was contributed by Sandia Laboratories, Livermore, California. The system is designed for both time- and space-dependent transport calculations. All generations of particles in the 1-keV to 1000-MeV energy range are allowed. Reference: SLL-74-0012. FORTRAN IV; CDC.

CCC-362/TRD-3

TRD-3 is a two-dimensional removal-diffusion code system contributed by Energy Research Laboratory, Hitachi Ltd., Hitachi-shi, Ibaraki, Japan. The system calculates neuton flux by the removal-diffusion method, dividing neutron flux into a removal flux and a diffusion flux. The removal portion is designated as the unscattered contribution of neutrons which come from the fission source. The neutrons scattered in the materials are removed from the removal flux and taken into the source of the diffusion equation for neutron balances. Gamma-ray transport is computed with use of buildup factors. Gamma-ray sources include fission and Neutron capture. Reference: Unpublished report by Hitachi Ltd. FORTRAN IV; IBM 3033.

PSR-110/DOQDP

The discrete ordinates quadrature generator package has been updated to reflect changes suggested by Enrico Sartori, OECD Nuclear Energy Agency Data Bank, Gif-sur-Yvette, France and the ORNL code contributors. The input data for the quadrature library generator were incorrect. This data set is a collection of two-dimensional quadratures in FIDO format for use with the DOT code series. In addition to not having the required additional data cards preceding each quadrature set, this file contained inappropriate array numbers and delimiters. To correct the problem, DOQDP was modified to punch, in FIDO format, quadratures appropriate as input to the ANISN or DOT codes. The quadrature library generator was also modified to read any of these quadrature sets. In order to easily use DOQDP output, the library generator was changed to read the quadrature sets from a separate data set. Interested users should request the complete code package. FORTRAN IV; IBM 360.

PSR-140/FANG

The FANG angular folding code for channel theory analysis was contributed by Oak Ridge National Laboratory. It is designed to calculate the "contributon flux" and "contributon leakage" necessary for performing "channel theory" analysis by using information available on a CCC-209/DOT III or CCC-276/DOT 3.5 scalar flux tape. A conversion routine, not yet packaged, is needed for using a DOT-IV (CCC-320) scalar flux tape. FANG also provides three-dimensional plots of streaming channels, performs space-energy dependent folding, and computes two-dimensional angular fluxes by expanding DOT flux moments. The code is flexibly dimensioned and reads input in fixed or free form FIDO format. Forward and adjoint fluxes are assumed available from previous DOT calculations. Reference: ORNL/TM-5228. FORTRAN IV and assembler language. IBM 360.

PSR-141/ELAN

ELAN is a neutron cross-section data processing code contributed by UKAEA Atomic Energy Establishment, Winfrith, Dorchester, Dorset, England through the OECD NEA Data Bank, Gif-sur-Yvette, France. Designed for use in the field of integral neutron energy spectrum measurements, ELAN calculates: point-by-point neutron cross sections from resonance parameters; production of group-averaged cross sections for bare detectors (slab, cylindrical and sandwich geometries); cut-off energies of filters; and shielded and self-shielded reaction rates in neutron foil activation detectors and sandwich foil packs. Reference: AEEW-M621. EGTRAN (a dialect of FORTRAN II); ICL KDF9.

PSR-143/BREESE-II

The auxiliary routines for implementing the albedo option in the MORSE Monte Carlo code system (CCC-203) were contributed by Bechtel Power Corporation, Oak Ridge National Laboratory, and Science Applications, Inc. The albedo option is implemented by providing (1) replacements for the default routines ALBIN and ALBDO in the MORSE code, (2) an estimating routine ALBDOE compatible with the SAMBO package in MORSE, and (3) a separate program that writes a tape of albedo data in the proper format for ALBIN. This version of BREESE allows the number of outgoing polar angles to be dependent upon the value of the incoming polar angle and the number of outgoing aximuthal angles to be a function of the value of both incoming and outgoing polar angles. Reference: ORNL/TM-6807. FORTRAN IV; IBM 360.

SCALE-03/TRUMP

The IBM version (A) of the code system for transient and steady-state temperature distributions and multidimensional systems has been updated to reflect modifications supplied by the UCND Computer Sciences Division contributors at the Oak Ridge National Laboratory. Details of these modifications may be requested from RSIC. The CDC version (B) of the program was not affected by this update.

CHANGES IN THE DATA LIBRARY COLLECTION

The following change was made in November.

DLC-68/FIPDOR

The 126-neutron group fission product cross section data library was generated using NPTXS and XLACS from PSR-63/AMPX-II at infinite dilution and 1000 K. A contribution of the Oak Ridge National Laboratory, data are provided for 181 fission products from the ENDF/B-IV library in the AMPX master library format. Those interested should also request PSR-63/AMPX-II or PSR-117/MARS to obtain retrieval codes to properly manipulate and utilize the data. Informal notes. EBCDIC IBM-360/91.

NOVEMBER 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.

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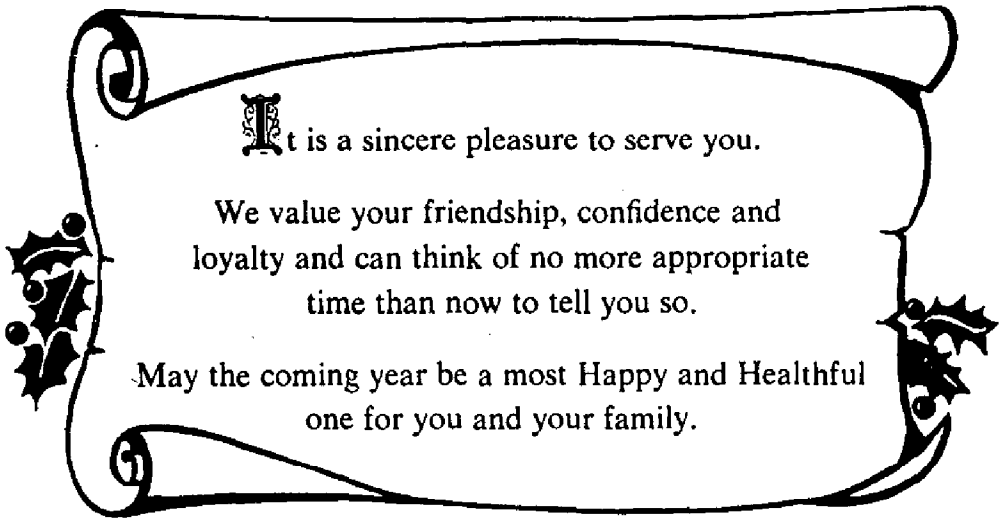

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