Radiation Safety Information Computational Center

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You may delay, but time will not, and lost time is never found again.—Benjamin Franklin

CHANGES TO THE RSICC CODE AND DATA COLLECTION

CCC-740/MCNP5/MCNPX

Los Alamos National Laboratory, Los Alamos, New Mexico, contributed a new version of MCNPX, Monte Carlo All-Particle Transport Code System, paired with the current release version of MCNP5 1.60 and MCNPDATA. **NOTE: There are no changes to MCNP5 1.60 or MCNPDATA in this package.**

MCNPX (MCNP eXtended) is a Fortran90 (F90) Monte Carlo radiation transport computer code that transports many particles over a broad range of energies. It is a superset of MCNP4C3 and has many capabilities beyond MCNP4C3. MCNPX is a production computer code that models the interaction of radiation with matter. New capabilities and enhancements of MCNPX2.7.0 are listed below. For details, see LA-UR-11-2295 posted on the MCNPX website http://mcnpx.lanl.gov/.

- Tally tagging
- CEM 3.02 upgrade
- Plot appearance upgrades
- Embedded sources
- Stopping power energy table control
- Cyclic time bins
- Focused beam sources
- PTRAC coincidence option
- LLNL photofission multiplicity
- Arithmetic MCPLOT options
- Receiver-operator characterization (ROC) tally option

- Pulse-height light tally: triple and quadruple coincidences
- Time-dependent F8 tallies using the pulse-height light option
- LAQGSM 3.03 upgrade

The recovery fee for this release of MCNP5/MCNPX will be waived. The package is distributed on a single DVD for Windows or UNIX. The executable-only package, C00740MNYCP07, includes executables for PC Windows and PC Linux systems (see abstracts for details); MCNPDATA; test problems and the referenced documentation. The C00740MNYCP06 package includes the items listed above plus source codes, makefiles, build scripts, and some additional documentation and utilities for use with MCNP5/MCNPX. Export control regulations restrict the distribution of Fortran source code. If restrictions apply, RSICC will send the executable-only version. Please order the package you prefer, and we will honor your preference if possible. References: LA-CP-11-00438 (April 2011); LA-UR-11-1502 (May 2011); LA-UR-03-06235 (April 2008); LA UR 10 06217, LA UR 03 05611, LA-UR-03-1987 (April 2003, revised 2/1/2008), LA-CP-03-0245 (April 2003, revised 2/1/2008). LA-CP-03-0284 (April 2003, revised 2/1/2008), App. C of LA-CP-03-0284 (revised 2/1/2008), LA-UR-08-0306, LA-09-00380 (2009), and other LANL reports. Fortran 90 and C; Windows PCs, Linux PC, and Mac for MCNP5 [Package ID: C00740MNYCP06 (full package) and C00740MNYCP07 (executable-only package)].

CCC-779/BUTTERCUP

BUTTERCUP is a Dual Layer Photon Buildup Factor Code contributed by Los Alamos National Laboratory, Los Alamos, NM. BUTTERCUP calculates photon dose and exposure buildup factors for several energies and material configurations of interest for two-layer shields based on a previously developed analytical fit formula. The package also contains spreadsheets of the buildup factors to which the formula was fit.

The package is transmitted on CD and includes the executable, the source code, the libraries (formatted for use), a Microsoft Excel file with all of the buildup factors and parameters for the fit formula used in the code, and the documentation. Fortran95, Excel, Windows or Linux. (C779MNYCP00).

CONFERENCES, COURSES, SYMPOSIA

RSICC attempts to keep its users and contributors advised of conferences, courses, and symposia in the field of radiation protection, transport, and shielding through this section of the newsletter. Should you be involved in the planning/organization of such events, feel free to send your announcements and calls for papers via email to riceaf@ornl.gov with "conferences" in the subject line by the 20th of each month. Please include the announcement in its native format as an attachment to the message. If the meeting is on a website, please include the url.

Every attempt is made to ensure that the links provided in the Conference and Calendar sections of this newsletter are correct and live. However, the very nature of the web creates the possibility that the links may become unavailable. In that case, please call or mail the contact provided.

TRAINING

MCNPX and Visual Editor Training

Classes are taught using the most recent (beta) version of the Visual Editor Code. All class attendees must have a valid MCNP5/MCNPX RSICC license. Bring proof of receipt (letter or email) to the class.

2011 Classes for Visual Editor		
August 8–12	Introduction to MCNP using the MCNPX Visual Editor	Seattle, WA
September 12–16	Introduction to MCNP using the MCNPX Visual Editor	Myrtle Beach, SC
September 19–23	Intermediate MCNP Visual Editor with a special emphasis on tallies and variance reduction	Myrtle Beach, SC
October 17–21	Introduction to MCNP using the MCNPX Visual Editor	Las Vegas, NV
October 24–28	Intermediate MCNP Visual Editor with a special emphasis on tallies and variance reduction	Las Vegas, NV
November 14–18	Intermediate MCNP Visual Editor with a special emphasis on tallies and variance reduction	London, UK
2012 Classes for Visual Editor		
January 16–20	Introduction to MCNP using the MCNPX Visual Editor	Las Vegas, NV
January 23–27	Intermediate MCNP Visual Editor with a special emphasis on tallies and variance reduction	Las Vegas, NV
April 16–20	Introduction to MCNP using the MCNPX Visual Editor	Las Vegas, NV
April 23–27	Intermediate MCNP Visual Editor with a special emphasis on tallies and variance reduction	Las Vegas, NV
May 14–18	Introduction to MCNP using the MCNPX Visual Editor	Honolulu, HI

The introductory workshops combine teaching on MCNP basics and how to create MCNP input files using the Visual Editor. The intermediate Visual Editor workshops focus on more advanced topics such as tallies and variance reduction using the Visual Editor.

Exercises will focus on creating input files and visualizing output data with the Visual Editor. Attendees are encouraged to bring their own input files for viewing and modifying in the visual editor; this is particularly important for the intermediate workshop.

The course description and registration information can be found at http://www.mcnpvised.com/index.html.

2011 Classes for MCNPX		
September 26–30	MCNPX Intermediate Workshop	Washington, DC
November 7–11	MCNPX Intermediate Workshop	London, U.K.
2012 Classes		
January 9–13	MCNPX Intermediate Workshop	Las Vegas, NV
May 21–25	MCNPX Intermediate Workshop	Honolulu, HI

The MCNPX team at Los Alamos National Laboratory offers interactive workshops for training users in the capabilities of MCNPX at the intermediate level.

The list of workshops is tentative, as workshops may be added, removed, or modified throughout the year, depending on user interests. Workshops with fewer than 12 registrants on the early registration date are subject to cancellation or rescheduling.

In order to process non-U.S. citizens by the class date, non-U.S. citizens must register at least 6 weeks prior to the start of the training class. All non-U.S. citizens who reside in countries listed in the U.S. Code of Federal Regulations, Title 10, Part 810.8, are required to register at least 8 weeks prior to the start of the training class. These participants must be processed by the DOE and should not make travel arrangements until approval from DOE has been obtained.

Additional information about the courses can be found at the website, http://mcnpx.lanl.gov/. To register send an email to Randy Schwarz at randyschwarz@mcnpvised.com, indicating the workshop of interest to you.

ENEN Course

The European Nuclear Education Network (ENEN) has provided the following information on an upcoming course.

Principles and Operation of Nuclear Reactors—September 12–23, 2011

Contact: Nadia Nowacki at

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PO Box 35
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Short Courses on Monte Carlo Analysis and Nuclear Criticality Safety

The Department of Nuclear Engineering at the University of Tennessee-Knoxville is offering short courses for radiation transport and criticality safety specialists during Tennessee Industries Week (TIW-46), August 8–12, 2011.

Radiological Assessment—This three-day course is based on selected topics from University of Tennessee courses on Radiological Assessment, Internal Dosimetry, and Uncertainty Analysis, and is intended for personnel working in areas associated with radiological assessment or internal dosimetry. Individuals professionally established in a particular area would benefit from exposure to a number of important topics, and those who are new to this area of science would benefit from the integration of a variety of important and relevant topics.

Fundamentals of nuclear physics, health physics, and internal dosimetry will be presented for review and to establish a common framework for subsequent presentations. Information presented on radionuclide transport and pathways analysis will include basic theory and solutions to several tutorial examples. Descriptions of several computer programs used for internal dosimetry and for radiological assessment will be presented, and details from several studies will be used as examples.

Information on external dosimetry generally follows material in the cited text. Material presented on internal dosimetry will go beyond the reference text and will involve computational methods as well as practical examples. Methods for analyzing bioassay program data will be carefully reviewed and case studies will be discussed.

Nuclear Criticality Safety—Engineers, scientists, and technical managers who wish to increase their knowledge and understanding of nuclear criticality safety will be interested in this intensive one-week short course. The topics covered in the course are based primarily on the experience of the five instructors, which totals over 120 years of nuclear criticality safety related experience. Such a wealth of experience needs to be shared with the criticality safety community including both new professionals in the field as well as experienced professionals.

The course topics include illustrative applications using the SCALE system developed at Oak Ridge National Laboratory with emphasis on the Monte Carlo code KENO, standards, regulations, review of accidents, hand calculation methods, subcritical limits, code validation techniques, accident response planning and management, and transient excursion modeling.

Monte Carlo Analysis—Monte Carlo is often the method of choice to solve complex problems in nuclear criticality safety and radiation shielding. To use Monte Carlo effectively, the analyst must understand the theoretical and computational fundamentals of the method, as well as the computational options available in particular computer tools. Also, it is sometimes advantageous to create new special-purpose Monte Carlo programs to solve particular problems rather than use an existing program. The Monte Carlo course runs for 5 days and has the following objectives:

1. To familiarize the student with the basic concepts of the Monte Carlo method in a general (non-transport) context to add to the ability of the student to apply the Monte Carlo method to a variety of problems in mathematics, physics, and engineering.
2. To familiarize the student with the particular mathematical techniques and probability distributions that are used in analog Monte Carlo solutions of neutral-particle radiation transport problems. This is reinforced through an in-class exercise that develops an analog Monte Carlo code solution to a simple slab transport problem.
3. To familiarize the student with the mathematical basis for variance reduction techniques: non-analog mathematical methods that increase the efficiency of the calculation without biasing the

solution. This is reinforced with a continuation of the in-class exercise to incorporate variance reduction techniques.

4. To apply the lessons learned to the most commonly used Monte Carlo code, MCNP. In a series of hands-on exercises with the PC version of MCNP, the novice user will learn to set up simple problems, and all levels of users will gain experience in using the variance reduction techniques offered by the MCNP code.

Special attention will be given to the understanding of the use of adjoint calculations in transport analyses, both as an alternate means of obtaining system responses and as importance functions for accelerating Monte Carlo forward solutions. Advantages and disadvantages of the adjoint mode versus the forward mode of analysis will be described. In addition, the relationship of Monte Carlo methods to deterministic methods will be described, including strategies involving the hybrid use of both methods to more efficiently solve certain transport problems.

Case Studies in Neutron Transport Theory—The study of the neutron transport equation is a delicate blend of theoretical mathematics, numerical methods and computational strategies describing the interaction of neutrons and nuclei. Not only do we gain physical insight from the solution to the transport equation, but we also create new mathematics and numerical methods for the solution of equations. This short course is offered to those individuals who want to experience the elegance of analytical transport theory and how this theory can impact the development of transport methods for application.

This course will concentrate on transforming theoretical solution representations of the neutron transport equation into numerically useable forms. The course will study reactor physics from neutron slowing down to multidimensional multigroup theory and criticality. Though the backdrop is reactor physics, our emphasis will be on analytical manipulations of the transport equation and the numerical realization of its solutions.

The deadline for registration is **July 22, 2011**. Classes are limited in size and will be filled on a first-come, first-serve basis. For additional information on these and other courses offered during TIW-46, contact Kristin England at the University of Tennessee, phone (865) 974-5048, email kengland@utk.edu, url http://www.engr.utk.edu/nuclear/TIW.html.

MCNPX-PoliMi Training Workshop

The Detection for Nuclear Nonproliferation Group in the Department of Nuclear Engineering and Radiological Sciences at the University of Michigan is hosting an MCNPX-PoliMi workshop August 23–24, 2011, in Ann Arbor, MI. This two-day workshop will introduce new users to the capabilities of the MCNPX-PoliMi code and acquaint experienced users with new features.

- MCNPX-PoliMi source capabilities
- Detector-response calculations
- Simulations of time-of-flight and cross-correlation distributions
- Simulations of multiplicity distributions

Contact clarkesd@umich.edu to get a registration form. Seating is limited; therefore, the registrations will be accepted on first-come-first-serve basis.

IAEA Workshop Monte Carlo Radiation Transport and Associated Data Needs for Medical Applications

The International Atomic Energy Agency (IAEA) is offering a 2-week workshop on "Monte Carlo Radiation Transport and Associated Data Needs for Medical Applications," October 17–28, 2011, in Trieste, Italy, at the Abdus Salam International Centre for Theoretical Physics. This workshop will revolve around the EGSnrc and BEAMnrc codes. There is no registration fee associated with attendance at the workshop. Priority will be given to participants from developing countries. The workshop Director is Roberto Capote of the IAEA and the lecturers include Iwan Kawrakow, Ernesto Mainegra-Hing, Frederic Tessier, Blake Walters and David W. O. Rogers. Visit the workshop website at http://www-nds.iaea.org/MC2011/MC2011.htmlx for more information, and to download the application form.

CONFERENCES

International Conference on Transport Theory (ICTT-22)

The International Conference on Transport Theory (ICTT-22) will be held September 11–15, 2011, in Portland, Oregon. The conference will bring together researchers in the several fields of engineering and science who use similar—or even identical—mathematical methods in their studies, meaning those which evolved from the Boltzmann transport theory. Possible topics include:

- Kinetic Theory
- Transport Problems in Plasma Physics
- Neutron Transport and Applications to Reactor Physics
- Stochastic Transport Problems - Non Conventional Applications
- Quantum Transport Problem
- Inverse Transport Problems
- Computational Methods
- Radiative Transfer - Fluid-dynamics

The registration page for the meeting is available at http://ne.oregonstate.edu/ICTT/Registration.htm. Additional information regarding the program, accommodations, and special events is available at the conference website: http://ne.oregonstate.edu/ICTT/.

ICNC2011

The International Conference on Nuclear Criticality (ICNC2011) which will be held at Heriot-Watt University, Edinburgh, United Kingdom, September 19–22, 2011, allows specialists from around the world to discuss, analyze and study the latest developments in the area of nuclear criticality safety. Details on the conference are available at the website, http://www.informaglobalevents.com/event/icnc2011. For information about registering, delegate information or any other customer service enquiries, please contact Energy Customer Services, Informa UK Ltd., PO Box 406, West Byfleet KT14 6NN UK (phone +44 (0) 20 7017 5518, fax +44 (0) 20 7017 4745, email energycustserv@informa.com).

INAC 2011

The International Nuclear Atlantic Conference (INAC) will convene its 2011 conference October 24–28, 2011, in Belo Horizonte, the capital of the state of Minas Gerais, in the Brazilian Southeast. The theme of the event will be *Nuclear Energy: New Jobs for a Better Life*, which intends to

discuss how to prepare young professionals for the opportunities that are surfacing with the renewed investment in the nuclear sector.

The conference will be organized around three independent but complementary technical meetings: The XVII Meeting on Nuclear Reactor Physics and Thermal Hydraulics (Enfir), the X Meeting on Nuclear Applications (Enan) and the II Meeting on Nuclear Industry (Enin).

Topics to be discussed at the event include nuclear power plant and research reactor operation, maintenance, troubleshooting, security and safety; research; irradiation activities; education; communications and public information; training programs; reactor siting, decontamination and decommissioning activities; current regulatory issues; radiopharmaceuticals; nuclear instrumentation; reactor physics; radioprotection; radioactive waste management; sustainability of energy sources; the uranium market; and social responsibility.

INAC 2011 will also promote the fourth edition of the Junior Poster Technical Sessions, where, under the supervision of nuclear researchers from Brazilian institutions, undergraduate students from a number of colleges and universities present relevant results achieved in their research work.

Completing the one-week program, ExpoInac, the event's traditional technical and commercial exhibition, showcases the contribution made by nuclear technology, products and services.

The conference will also include a historical exhibition, open to the general public, to celebrate the 50th anniversary of the Triga IPR-R1, the first reactor of its type installed in the southern hemisphere, and the 59th anniversary of the Nuclear Technology Development Center (CDTN), the first nuclear energy research institute founded in Brazil, both located in Belo Horizonte.

Details about registration and paper submission can be found at the conference website: http://www.inac2011.com.br/inac.php.

CALENDAR

August 2011

15th International Conference on Environmental Degradation of Materials in Nuclear Power Systems, Aug. 7–11, 2011, Colorado Springs, CO. Contact: TMS (phone 724-776-9000 ext. 243, fax 724-776-3770, email mtgserv@tms.org) url www.tms.org/meetings/specialty/ed2011.

September 2011

5th Annual RadWaste Summit, Sept. 6–9, 2011, Las Vegas, NV. Contact: Exchange Monitor (phone 877-303-7367, email forums@exchangemonitor.com) url www.radwastesummit.com.

SET 2011, 10th International Conference on Sustainable Energy Technologies, Sept. 4–7, 2011, Istanbul, Turkey. Contact: Prof. Dr. Sümer Sahin, Atılım University (email ssahin@atilim.edu.tr) url http://www.set2011.org.

NUTECH-2011, International Conference on Development and Applications of Nuclear Technologies, Sept. 11–14, 2011, Kraków. Poland. Contact: AGH Univeristy of Science & Techynology (phone 48-12-617-2975, fax 48-12-634-0010, email nutech2011@ftj.agh.edu.pl) url www.ftj.agh.edu.pl/~nutech2011.

Waste Management, Decommissioning, and Environmental Restoration for Canada's Nuclear Activities, Sept. 11–14, 2011, Toronto, Ontario, Canada. Contact: Denise Rouben, CNS (phone 416-977-7620, fax 416-663-3504, email cns-snc@on.aib.com) url www.cns-snc.ca/events/waste-management-decommissioning-and-environmental.

ICTT-22, International Conference on Transport Theory, Sept. 11–15, 2011, Portland, Oregon. Contact: Todd Palmer, Technical Program Chair, Oregon State University (palmerts@ne.orst.edu) url http://ne.oregonstate.edu/ICTT/.

ISFNT-10, 10th International Symposium on Fusion Nuclear Technology, Sept. 11–16, 2011, Portland, OR. Contact: Shannon Eddins, Idaho National Laboratory (email isfnt10@inl.gov) url www.isfnt-10.org.

20th International Conference on Nuclear Energy for New Europe, Sept. 12–15, 2011, Bovec, Slovenia. Contact: Nuclear Society of Slovenia (phone 386-1-588-5298, fax 386-1-588-5376, email nene2011@ijs.si) url www.nss.si/nene2011/.

ICNC2011, International Conference on Nuclear Criticality, Sept. 19–22, 2011, Heriot-Watt University, Edinburgh, United Kingdom. Contact: Energy Customer Services, Informa UK Ltd, PO Box 406 West Byfleet KT14 6NN UK (phone +44 0 20 7017 5518, fax +44 0 20 7017 4745, email energycustserv@informa.com) url http://www.informaglobalevents.com/event/icnc2011.

RADECS 2011, 11th European Conference on Radiation Effects on Components and Systems, Sept. 19–23, 2011, Seville, Spain. Contact: Héctor Guerrero, INTA (email radecs2011@inta.es) url www.radecs2011.org.

ICEM 2011, 14th International Conference on Environmental Remediation and Radioactive Waste Management, Sept. 25–29, 2011, Reims, France. Contact: Sylvie Delaplace, SFEN (phone 33-0-1-53-58-32-16, fax 33-0-1-53-53-32-11, email icem11.france@sfen.fr) url www.sfen.fr/icem-11.

SMR2011, ASME 2011 Small Modular Reactors Symposium, Sept. 28–30, 2011, Washington, DC. Contact: Mary Jakubowski, ASME (phone 212-591-7637, email jakubowskim@asme.org) url www.asmeconferences.org/smr2011.

October 2011

International Conference on the Future of Heavy-Water Reactors, Oct. 2–5, 2011, Ottawa, Ontario, Canada. Contact: Laurence Leung, Atomic Energy of Canada, Ltd (phone 613-584-8811 ext 44813, email leungl@aecl.ca) url www.cns-snc.ca/events/cns-fhwr.

2011 ANS Winter Meeting and Nuclear Technology Expo, Oct. 30–Nov. 3, 2011, Washington, DC. The website is http://www.new.ans.org/meetings/c_1.