Radiation Safety Information Computational Center

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Life is like a roller-coaster with thrills, chills, and a sigh of relief."

~ Susan Bennett

TABLE OF CONTENTS

CHANGES TO THE RSICC CODE AND DATA COLLECTION

There were two updates to the RSICC catalog for those individuals that may be interested.

CCC-782/PENELOPE2014

Facultat de Fisica (ECM), Universitat de Barcelona and Universitat Politècnica de Catalunya de Barcelona, Spain, through the Nuclear Energy Agency Data Bank, Issy-les-Moulineaux, France, contributed PENELOPE2014. PENELOPE performs Monte Carlo simulation of coupled electron-photon transport in arbitrary materials and complex quadric geometries. A mixed procedure is used for the simulation of electron and positron interactions (elastic scattering, inelastic scattering and bremsstrahlung emission), in which 'hard' events (i.e. those with deflection angle and/or energy loss larger than pre-selected cutoffs) are simulated in a detailed way, while 'soft' interactions are calculated from multiple scattering approaches. Photon interactions (Rayleigh scattering, Compton scattering, photoelectric effect and electron-positron pair production) and positron annihilation are simulated in a detailed way.

Changes over PENELOPE-2011 include:

- Global parameters (maximum number of materials, dimension of the energy interpolation grid, size of the secondary stack) are defined in module 'PENELOPE_mod'.

- Particle state variables are stored in module 'TRACK_mod', which is used in the main program and in the tracking routines.

- Ionizations of inner shells by electron and positron impact are described as proper inelastic collisions. This ensures that the net deposited energy in each interaction event is positive.

- Cross sections for ionization of N subshells calculated from the relativistic distorted wave Born approximation has been included in the database.

- For electrons and positrons, the energy loss DESOFT due to soft interactions between two consecutive hard interactions (which is delivered through module 'PENELOPE_mod'), can be deposited uniformly along the step. That is, instead of depositing DESOFT at the hinge we can use a kind of continuous-slowing-down model, and provide a more realistic description of the slowing down due to energy-loss events.

- This feature is used in 'penmain.f' to evaluate the average energy loss along track segments that end at interfaces, thus giving improved stability for geometries involving thin bodies. It also reduces the dependence of results on the value of the user parameter DSMAX. Manifest improvements are found, e.g., in the case of electron transport through a stack of very thin foils.

- The geometry package 'pengeom.f' has been modified. Array dimensions are now defined in the module 'PENGEOM_mod'. Element labels have been extended to 4-character alphanumeric strings.

- The variance-reduction routines 'penvared.f' have been reformulated. The new routines include the techniques of bremsstrahlung splitting, and Woodcock delta scattering of photons. X-ray slitting can also be applied in 'penmain.f'.

- The program 'penmain.f' includes additional options (bremsstrahlung and x-ray splitting, modifiable geometry parameters), as well as a refined calculation of absorbed dose in inhomogeneous volumes.

- Two programs, 'penmain-sum.f' and 'pencyl-sum.f', are provided for combining results from independent simulation runs of the same problem.

- Optionally, the program 'penmain.f' can keep track of the age of particles, measured from the start of the primary particle that initiates each shower.

The package is transmitted on a CD which includes the reference material, Windows executables for GVIEW2D, GVIEW3D, GVIEWC and SHOWER, source and example files. Fortran; Windows or Linux (RSICC ID: C00782PCX8601 NEADB ID NEA-1525/22).

CCC-830/DART-V1

CEA SACLAY, Nuclear Energy Directorate, Gif-Sur-Yvette, France through the OECD Nuclear Energy Agency Data Bank, Issy-les-Moulineaux, France, contributed DART-V.1, a displacement per atom, primary knocked-on atoms produced in an atomic solid target package. DART calculates the total number of displacements, primary knocked-on atoms, recoil spectra, displacement cross sections and displacement per atoms rates in a poly atomic solid target, composed of many different isotopes, using ENDF/B-VI derived cross sections. To calculate these values, different incident particles were considered: neutrons, ions and electrons. The user needs only to specify an incident particle energy spectrum and the composition of the target. The number of displaced atoms is calculated within the Binary Collision Approximation framework. To calculate the number of displacements the DART code does not use the classical NRT dpa analytical formula, which is only appropriate for projectile and target of the same mass. It numerically solves the linearized Boltzmann equation for a polyatomic target.

It can be a useful tool to select the nature and energy of ions or electrons in particle accelerators or electron microscopes to mimic the primary damage induced by neutron irradiation in nuclear plants or fission facilities.

Nuclear data:

- Typically any ENDFB format evaluation may be used. This package includes the ENDFB-VI nuclear data library.

Energy ranges:

- Neutron or ion: 10E-11 to 20 MeV

Data library distributed with DART v1.0:

- ENDFB-VI nuclear data library

Source files are not included in this package. DART-V1 is runs on Linux and MacOS 32 and 64 bit Operating Systems. DART-V1 is distributed on CD. Included are executables for Linux, and MacOS, data libraries, test cases and documentation. Fortran 77, C; PCs. The libraries needed to run DART can be created using NJOY99 (P00480MNYCP00). (C00830MNYCP00 NEADB ID NEA-1885/01)

SINGLE-USER LICENSE AGREEMENT REVISED

The single-user license agreement has been revised to address concerns regarding changes in end-use and employment changes of individuals that have received packages from RSICC. In some instances individuals obtain approvals from our Federal regulators for use of software packages for very specific purposes or while employed or associated with specific organizations. To address this concern, the single-user license agreement has been modified to indicate that the license is only valid for the end-use as stated in the Licensee's request and only while associated with the organization under which the request is being made. After February 1, 2015, the individual's single-user license would no longer be valid if they change their end-use or are no longer associated with the organization for which they obtained the original license. In these cases, the individual would need to submit a new request to RSICC for the package for the new end-use or the new affiliation.

SCIENCE EDUCATION PROGRAMS AT OAK RIDGE NATIONAL LABORATORY

Looking for an internship or post-graduate opportunity at Oak Ridge National Laboratory? The Science Education Programs at Oak Ridge National Laboratory provide paid opportunities for undergraduates, grad students, recent graduates, and faculty to participate in high-quality research alongside world-class scientists to solve real-world problems. Opportunities are available for internships and co-ops, research appointments, and sabbaticals.

You can access all available opportunities through the website at http://www.orau.org/ornl. The Talent and Opportunity System allows you to create a profile, and then answer only 5 or 6 questions for each program or job posting for which you apply.

All levels of participants from undergraduates to faculty are encouraged to publish research papers with their mentors. Please browse through the Research Profiles on the different participants and their research experiences at the right hand side of the bottom of the web site listed above. Also, there is a video of research participants at ORNL sharing their thoughts on how access to world-class research facilities and staff has catapulted their careers in science and technology. You can find it on YouTube at http://ow.ly/2EQLz.

CONFERENCES, TRAINING COURSES, SYMPOSIA

RSICC attempts to keep its customers 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 walkersy@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. Please provide a website address for the event if one is available.

Every attempt is made to ensure that the links provided in the Conference and Calendar sections of this newsletter are correct; however, if the links become unavailable, please call the point of contact for the event.

CONFERENCES

ICNC 2015

The Nuclear Criticality Safety Division of the American Nuclear Society (ANS) will host the International Conference on Nuclear Criticality (ICNC): 35 Years of International Cooperation. The international conference is co-sponsored by the NEA and will be held at the Omni Hotel in Charlotte, North Carolina from **September 13-17, 2015**.

For up-to-date information about this conference, visit their website at http://ncsd.ans.org/site/icnc2015.htm.

The Pennsylvania State University 14th Annual Radiation Safety Roundtable and 2015 Research Reactor Safety Roundtable

The Pennsylvania State University will be hosting two roundtables this year - the 14th Annual Radiation Safety Roundtable will be held **September 14, 15 and 16, 2015** and the 2015 Research Reactor Safety Roundtable will be held **September 17 and 18, 2015**. Both will be at the PSU State College campus. These roundtables bring together reactor and radiation safety professionals from the academic, medical, government lab, corporate, and (occasionally) regulatory sectors for an informal but in-depth discussion on current issues and creative solutions to shared problems.

For conference information please go to:
Radiation Safety Roundtable – http://ehs.psu.edu/radiation-protection/radiation-safety-roundtable

Research Reactor Roundtable – http://ehs.psu.edu/radiation-protection/research-reactor-safety-roundtable

Or contact Jeff Leavey at JAL62@psu.edu.

The 17th International Conference on Emerging Nuclear Energy Systems (ICENES2015)

Please note the conference DATE AND LOCATION have been changed to the following:

This conference will consist of an informative and comprehensive scientific program, featuring oral and poster presentations and a commercial exhibition. This will provide a unique opportunity to become familiar with the most recent advancements in innovative nuclear energy systems, as well as looking at "bold" and "unthinkable" ideas on a sound scientific-technical basis. The forum will also be open to intellectual debate leading to practical applications around innovative non-nuclear technologies, such as hydrogen energy, solar energy, deep space exploration and others. This conference will take place **October 4-8, 2015** inclusive, in Istanbul, Turkey.

For up-to-date information about this conference, visit their website at http://www.icenes2015.org.

2015 ANS Winter Meeting and Nuclear Technology Expo

This meeting will be held **November 8-12, 2015**, in Washington, DC at the Marriott Wardman Park. Please visit the ANS website for more information at www.ans.org.

TRAINING COURSES

LANL MCNP6 Class Schedule

Website: https://laws.lanl.gov/vhosts/mcnp.lanl.gov/classes/classinformation.shtml

Date	Course Name and Description	Cost
July 27-29, 2015 Los Alamos, NM	Unstructured Mesh with Attila4MC Non-US citizens must register by 2015-05-22 | Mon 12:30 - Wed 4:30	$1000 or $800*
Aug 3-7, 2015 Los Alamos, NM	Introduction to MCNP6 Non-US citizens must register by 2015-05-29 | Mon 10:30 - Fri 12:00	$1800 or $1500*
Aug 10-14, 2015 Los Alamos, NM	Criticality Calculations with MCNP6 Non-US citizens must register by 2015-06-05 | Mon 10:30 - Fri 12:00	$1800 or $1500*
Aug 17-21, 2015 Los Alamos, NM	Variance Reduction with MCNP6 Non-US citizens must register by 2015-06-12 | Mon 10:30 - Fri 12:00	$1800 or $1500*
Oct 19-23, 2015 Los Alamos, NM	Introduction to MCNP6 Non-US citizens must register by 2015-08-14 | Mon 10:30 - Fri 12:00	$1800 or $1500*
Oct 26-28, 2015 Los Alamos, NM	Unstructured Mesh with Attila4MC Non-US citizens must register by 2015-08-21 | Mon 12:30 - Wed 4:30	$1000 or $800*

*** Early payment discount:** A discount of $300 per student is given when the registration payment is received in full at least 4 weeks before the start of class.

*** Classes may be cancelled or postponed if fewer than 8 students register.**
*** Maximum of 15 students per class.**

Introductory classes are for those who have little or no experience with MCNP. This class surveys the features of MCNP so the beginning user will be introduced to the capabilities of the program, and will have hands-on experience at running the code to solve simple problems. Course topics include Basic Geometry, Source Definitions, Output (Tallies), Advanced Geometry (repeated structures specification), Variance Reduction Techniques, Statistical Analysis, Criticality, Plotting of Geometry and Tallies, and Neutron / Photon / Electron Physics.

Intermediate workshops cover the entire spectrum of MCNP/MCNPX but proceed at a much faster pace and are more in-depth than Introductory classes. These workshops are open to new users; the first day of class is a review of basics. However, the intermediate workshops are targeted toward more experienced users and are more problem solving than lecture classes. Intermediate workshops feature flexible course content, skip topics of least interest to the participants, and provide significantly more depth than introductory classes.

Advanced classes - Variance Reduction & Criticality are for people with MCNP experience who want to extend their knowledge and gain depth of understanding. Most areas of MCNP operation will be discussed in detail, with emphasis on Advanced Geometry, Advanced Variance Reduction Techniques, and other advanced features of the program. Time will be available to discuss approaches to specific problems of interest to participants. Classes on specific topics are offered when there is sufficient interest.

NOTE: While MCNP supports a number of platforms, LANL class computers are usually Windows based.

More information about the MCNP courses at LANL is available on their website at https://laws.lanl.gov/vhosts/mcnp.lanl.gov/classes/classinformation.shtml.

MCNP6 and Visual Editor Training

Website: http://www.mcnpvised.com/index.html

MCNP6 Intermediate Workshops 2015 & 2016		
August 31-September 4, 2015	MCNP6 Intermediate Workshop	Orlando, FL
October 12-16, 2015	MCNP6 Intermediate Workshop	Paris, France
January 11-15, 2016	MCNP6 Intermediate Workshop	Las Vega, NV

Intermediate Workshops cover the entire spectrum of MCNP6 but proceed at a much faster pace and are more in-depth than Introductory Classes. These workshops are open to new users; the first day is a review of basics. However, the intermediate workshops are targeted toward more experienced users and are more problem solving than lecture classes. Intermediate workshops feature flexible course content, skip topics of least interest to the participants, and provide significantly more depth than introductory classes.

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://www.mcnpvised.com/train.html.

To register send an email to Randy Schwarz at randyschwarz@mcnpvised.com, indicating the workshop of interest to you.

Visual Editor Classes 2015 & 2016		
July 13-17, 2015	Beginning Visual MCNP6	Anaheim, CA
July 20-24, 2015	Intermediate Visual MCNP6	Anaheim, CA
August 17-21, 2015	Beginning Visual MCNP6	Orlando, FL
August 24-28, 2015	Intermediate Visual MCNP6	Orlando, FL
September 14-18, 2015	Beginning Visual MCNP6	Las Vegas, NV
September 21-25, 2015	Intermediate Visual MCNP6	Las Vegas, NV
October 5-9, 2015	Beginning Visual MCNP6	Paris, France
October 12-16, 2015	Intermediate MCNP6 Workshop	Paris, France
October 19-23, 2015	Advanced Visual MCNP6 with Applications in Mesh Tallies and Variance Reduction.	Prague, Czech Republic
November 2-6, 2015	Advanced Visual MCNP6 with Applications in Mesh Tallies and Variance Reduction.	South Korea
November 30-Dec. 4, 2015	Beginning Visual MCNP6	Richland, WA
December 7-11, 2015	Advanced Visual MCNP6 with Applications in Mesh Tallies and Variance Reduction.	Richland, WA
January 4-8, 2016	Beginning Visual MCNP6	Las Vegas, NV
January 11-15, 2016	Intermediate MCNP6 Workshop	Las Vegas, NV
February 15-19, 2016	Beginning Visual MCNP6	Paris, France
February 22-26, 2016	Intermediate MCNP6 Workshop	Paris, France
October 3-7, 2016	Beginning Visual MCNP6	Paris, France
October 10-14, 2016	Intermediate MCNP6 Workshop	Paris, France

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

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.

Practical MCNP for the Health Physicist, Medical Physicist, and Radiological Engineer

The next "Practical MCNP for the Health Physicist, Medical Physicist, and Radiological Engineer" class presented by the Radiation Measurements Group at Los Alamos National Laboratory has been scheduled for **August 24-28, 2015**. The course, to be held in Los Alamos, has recently been updated to reflect the release of MCNP6. Further details can be found on RSICC's homepage under the "Workshops MCNP-Health Physicist" link (http://www.lanl.gov/orgs/rp/mcnp.shtml).

NEA Nuclear Energy Agency

Class sizes are limited and courses may be cancelled if minimum enrollment is not obtained one month prior to course. Course fees paid are refundable up to one month before each class.

Please note that all attendees must be registered users.

Date	Class	Course Content	Price	Location
5-9 October 2015	Beginning Visual MCNP6 Workshop	Course description To register, click here	2200 Euros	Paris, France
12-16 October 2015	MCNP6 Intermediate Workshop	Course description To register, click here	2200 Euros	Paris, France

* The fee includes the training course, luncheons and coffee breaks.

Contact: programs@oecd-nea.org

SCALE Training Courses

Training is provided by developers and expert users from the SCALE team. Courses provide a review of theory, description of capabilities and limitations of the software, and hands-on experience running problems of varying levels of complexity.

All attendees MUST be licensed SCALE 6.1 users. SCALE 6.1 is available from ORNL/RSICC in the USA, the OECD/NEA Data Bank in France, and the RIST/NUCIS in Japan. All currently scheduled SCALE Courses are described below.

Date	Course Name and Description	Location	Cost
August 10-14, 2015	**SCALE Criticality Safety Calculations Course** Introductory through advanced criticality calculations using KENO V.a and KENO-VI; resonance self-shielding techniques	ORNL Oak Ridge, TN USA	$2000*
August 17-21, 2015	**SCALE Sensitivity and Uncertainty Calculations Course** TSUNAMI: 1D, 2D, and 3D $\mathbf{k_{eff}}$ sensitivity/uncertainty analysis; 2D generalized sensitivity analysis for lattice physics; reactivity sensitivity analysis; advanced S/U methods for code and data validation using trending analysis and data assimilation (data adjustment) techniques; $\mathbf{k_{eff}}$ burnup credit validation	ORNL Oak Ridge, TN USA	$2000*
August 24-28, 2015	**SCALE Lattice Physics and Depletion Course** 2D lattice physics calculations; 1D, 2D, and 3D depletion calculations; resonance self-shielding techniques including Monte Carlo Dancoff factors for non-uniform lattices; generation of libraries for ORIGEN-ARP	ORNL Oak Ridge, TN USA	$2000*
August 31 - September 4, 2015	**SCALE/ORIGEN Standalone Fuel Depletion, Activation, and Source Term Analysis Course** Isotopic depletion, activation analysis, and source term characterization using ORIGEN/OrigenArp	ORNL Oak Ridge, TN USA	$2000*

**Full-time university students can register at a reduced rate. Both professional and student registration fees are discounted $200 for each course over one.*

FOREIGN NATIONAL VISITORS TO ORNL *- Payment MUST be received at least one week prior to attending the training course. All foreign national visitors must register 40 days before the start date of the training course they plan to attend.*

For more information regarding this class, visit their website at
http://scale.ornl.gov/training_2015.shtml

SYMPOSIA

2015 CALENDAR

July

U.S. Women in Nuclear Conference, July 12-15, 2015, Austin, TX. For more information visit the website at: http://www.nei.org/Conferences/U-S-Women-in-Nuclear-Conference.

August

Radiation Protection Forum, August 2-5, 2015, Orlando, FL. For up-to-date information about this conference, visit their website at http://www.nei.org/Conferences/Radiation-Protection-Forum.

16th International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-16), August 30-September 4, 2015, Chicago IL. For up-to-date information about this conference, visit their website at http://nureth16.anl.gov/.

September

International Conference on Nuclear Criticality Safety, ICNC2015, September 13-17, 2015, Charlotte, NC. For up-to-date information about this conference, visit their website at http://ncsd.ans.org/site/icnc2015.htm.

Global 2015 International Nuclear Fuel Cycle Conference, September 20-24, 2015, Paris, France. For up-to-date information about this conference, visit their website at https://www.sfen.fr/GLOBAL.

October

17th International Conference on Emerging Nuclear Energy Systems (ICENES2015), October 4-8, 2015, Istanbul, Turkey. For up-to-date information about this conference, visit their website at http://icenes2015.org/index.php.

International Conference on Clinical PET-CT and Molecular Imaging (IPET2015): PET-CT in the era of multimodality imaging and image-guided therapy, October 5-9, 2015, Vienna, Austria. For up-to-date information about this conference, visit their website.

November

2015 American Nuclear Society (ANS) Winter Meeting and Nuclear Technology Expo, November 8-12, 2015, Washington D.C. For up-to-date information, visit their website.

International Conference on Research Reactors: Safe Management and Effective Utilization, November 16-20, 2015, Vienna, Austria. For up-to-date information, visit their website.

2016 CALENDAR

January

Institute of Nuclear Materials Management (INMM) 31st Spent Fuel Management Seminar, January 11-13, 2016, Washington, D.C. See website for more information http://www.inmm.org/31st_Spent_Fuel_Seminar.htm.

February

Nuclear and Emerging Technologies for Space (NETS) 2016, February 22-25, 2016, Huntsville, AL. See website for more information http://www.ans.org/meetings/c_3.

May

47th Annual Meeting on Nuclear Technology (AMNT 2016), May 10-12, 2016, Hamburg, Germany. See website for more information http://www.nucleartech-meeting.com/welcome.html.

June

2016 Society of Nuclear Medicine and Molecular Imaging (SNMMI) Annual Meeting, June 11-15, 2016, San Diego, CA. More information to follow.

July

61st Annual Health Physics Society (HPS) Meeting, July 17-21, 2016, Spokane, WA. See website for more information http://hps.org/meetings/meeting39.html.