Radiation Safety Information Computational Center

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Goodwill is no easy symbol of good wishes. It is an immeasurable and
tremendous energy, the atomic energy of the spirit.—Eleanor B. Stock

CHANGES TO THE RSICC CODE AND
DATA COLLECTION

CCC-795/JASMINE V.3

JASMINE V.3 was contributed by the Nuclear Safety Research Center, Japan Atomic Energy Agency, Tokai-mura, Naka-gun, Ibaraki-ken, Japan, through the OECD Nuclear Energy Agency Data Bank, Issy-les-Moulineaux, France. A steam explosion occurs when hot liquid contacts with cold volatile liquid. In this phenomenon, fine fragmentation of the hot liquid causes extremely rapid heat transfer from the hot liquid to the cold volatile liquid and explosive vaporization, bringing shock waves and destructive forces. The steam explosion due to the contact of the molten core material and coolant water during severe accidents of light water reactors has been regarded as a potential threat to the integrity of the containment vessel. A mechanistic steam explosion simulation code, JASMINE, was developed that is applicable to plant scale assessment of the steam explosion loads. JASMINE is a code developed to describe the fission reactor Fuel Coolant Interaction it stays for JAEA Simulator for Multiphase Interactions and Explosions. Two processes are treated: the premixing (molten fuel and coolant) and the explosion with

different behavior and time scale.

JASMINE consists of two separate models: a molten core behavior model and a multiphase flow model. For the explosion an additional component is attached for the fragments treatment. The domain considered is cylindrical sectors (r-z) with azimuthal angle theta, with melt jet, melt pool, two phase premixing of the coolant, and fragments treatment in the explosion. The molten model called MELT uses one dimensional conservation equations in z direction for the melt jet. The same is done in radial direction for the melt pool. Particles formed during melting and heat exchange are treated by Lagrangian with energy and motion conservation. The multiphase flow model is an extension of the ACE3D code. Hydrodynamic drag is included. In case of explosion a special treatment is done considering heat transfer and conservation laws. Coupling of melt and two-phase models is made. The methods applied to solve equations on a 3-D grid mesh are the cubic-interpolated pseudo particle and the finite difference method.

The package is transmitted in a self-extracting executable containing source, sample problems, documentation and reference materials. F90, PERL, and Linux workstations (C00795MNYCP00).

CCC-796/KICHE 1.3
KICHE 1.3 was contributed by the Nuclear Safety Research Center, Japan Atomic Energy Agency, Tokai-mura, Naka-gun, Ibaraki-ken, Japan, through the OECD Nuclear Energy Agency Data Bank, Issy-les-Moulineaux, France. KICHE numerically solves the mechanistic model for iodine chemical reactions in the containment vessel of light water reactors during a severe accident. The system is a vessel containing gas and aqueous phases and walls simulating the containment vessel or a part of it. The vessel inside is at an assumed temperature, pressure and irradiation (mainly gamma-rays from fission products) condition. Iodine released from the damaged core is mainly non-volatile iodide, and it is readily absorbed in water by the containment spray. However, the irradiated condition in the containment may cause radiation chemical reactions converting iodide into volatile iodine species such as elemental iodine or organic iodine that eventually releases to the gas phase. The purpose of the model is to evaluate the amount and the species of volatile iodine released by such radiation chemical effects.

KICHE simulates such chemical behavior of iodine under irradiation by mechanistic model. The system is dominated by reactions specific to an irradiated environment, in which chemical effects by water radiolysis products (radicals) prevail. Thus, the primary reaction field is the aqueous phase. In a so-called mechanistic model, the generation and interactions of water radiolysis products, their reactions with iodine species, and some non-chemical processes such as adsorption and interface mass transfer are handled. Those reactions and transfer laws are converted into a set of ordinary differential equations and solved numerically. Each reaction and rate constant is given by referring a database constructed with knowledge from fundamental researches. On the other hand, a semi-empirical model uses a more simplified overall reaction set (especially, water radiolysis is not treated directly) with rate constants tuned on experimental data. While the mechanistic model has a large number of reactions and needs more computer resource than the semi-empirical model, the advantage is its versatility and the availability as a tool for examination of mechanisms. Also, recent PCs and usage of an implicit scheme on the time integration make the mechanistic model practical enough.

The KICHE package is transmitted in a self-extracting executable containing source, sample problems, data files, documentation, and reference materials. F95 and Linux (C00796PCX8600).

CCC-797/RAPID
RAPID was contributed by the Korea Atomic Energy Research Institute (KAERI), Yusung, Daejeon Republic of Korea through the OECD Nuclear Energy Agency Data Bank, Issy-les-Moulineaux, France.

The RAPID (RAdial power and burnup Prediction by following fissile Isotope Distribution in the pellet) model was developed to predict the radial distribution of power, burnup and fissionable nuclide densities in the LWR UO_2 fuel pellets to be used in the fuel performance analysis code. It considers the specific radial variations of the neutron reactions of all the fissionable nuclides as a function of burnup and ^{235}U enrichment in the pellet. Comparison of the RAPID prediction with the measured data of the irradiated fuels and the predicted results by other codes showed good agreement, and therefore, the RAPID model can be used for the UO_2 fuel of up to 10 w/o ^{235}U enrichment and 150 MWD/kgU pellet average burnup under the LWR environment.

The package is transmitted in a self-extracting executable and contains source, sample input and output, documentation and reference materials. Fortran 90, Linux, Windows, and MacOS computers (C00797PCX8600).

MIS-016/CCVM Database (October 2010 Version)

The CCVM Database was contributed by the OECD Nuclear Energy Agency Data Bank, Issy-les-Moulineaux, France. Over the years the NEA Data Bank has collected a sizable subset of separate effects test reactor transient and LOCA Integral Test Data (ITD.). The Integral Experiments are designed to follow the behavior of a reactor system in various off-normal or accident conditions. The ITD matrix data is suitable for the validation of best estimate thermal-hydraulic computer codes: it consists of well-founded experiments, for which comparison of the measured and calculated parameters forms a basis for establishing the accuracy of the test predictions. For the ITD the following classes of accidents are considered:

PWR:
(1) large breaks (rupture area greater than 25 percent of the maximum pipe area connected with the pressure vessel Amax);
(2) small and intermediate breaks (rupture area less than or equal to 25 percent Amax);
(3) small and intermediate breaks in PWRs with once through steam generators (OTSG);
(4) transients, where upset conditions are created by single or multiple failures of one or more systems in the plant;
(5) transients at shutdown; and
(6) accident management for a non-degraded core.

BWR:
(1) LOCA;
(2) Transients: start uptests, frequent operational transients and anticipated transients without scram (ATWS).

The package is transmitted on two DVDs. The CCVM Database consists of 63 combined experiments. Each experiment is in a separate directory containing an abstract, data, and report. Reference: OCDE/GD(97)12, NEA/CSNI/R(96)17 (July 1996). Many computers (M00016MNYCP00).

DLC-254/BUGJEFF311.BOLIB

The Italian National Agency for New Technologies, Energy and the Environment "E. Clementel" Research Centre, Bologna, Italy and Institute of Physics and Power Engineering, Obninsk, Russian Federation through the OECD Nuclear Energy Agency Data Bank, Issy-les-Moulineaux, France contributed this new library. The ENEA-Bologna Nuclear Data Group generated the BUGJEFF311.BOLIB library in FIDO-ANISN format. BUGJEFF311.BOLIB is a broad-group coupled neutron and photon working cross section library dedicated to LWR shielding and pressure vessel

dosimetry applications and it is based on the OECD-NEA Data Bank JEFF-3.1.1 library of evaluated nuclear data. The neutron and photon energy group structures (47 neutron groups + 20 photon groups) of BUGJEFF311.BOLIB are the same as those of the corresponding BUGLE-96 similar library generated at ORNL in 1996, based on ENDF/B-VI.3 evaluated nuclear data. BUGJEFF311.BOLIB was produced from the ENEA-Bologna VITJEFF311.BOLIB fine-group mother library in AMPX format, based on JEFF-3.1.1 data.

NUMBER OF GROUPS: 47 neutron groups and 20 photon groups
THERMAL NEUTRON GROUPS: 5 neutron groups below 5.043 eV without/ with upscattering cross sections retained
NEUTRON ENERGY RANGE: 1.0E-5 eV - 17.332 MeV
PHOTON ENERGY RANGE: 10.0 keV - 14.0 MeV
CROSS SECTION LEGENDRE ORDER: P7 for materials with Z less or equal to 29 (copper); P5 for the remainder of the nuclides
NUMBER OF MATERIALS: 182
MATERIALS INCLUDED:
H-H2O H-CH2 H-ZrH D-D2O H-3 He-3 He-4 Li-6 Li-7 Be-9 Be-Th B-10   B-11 C-nat
C-Gph N-14 N-15 O-16 O-17 F-19 Na-23 Mg-24 Mg-25 Mg-26 Al-27 Si-28 Si-29 Si-30 P-31
S-32 S-33 S-34 S-36 Cl-35 Cl-37 K-39 K-40 K-41 Ca-40 Ca-42 Ca-43Ca-44 Ca-46
Ca-48 Ti-46 Ti-47 Ti-48 Ti-49 Ti-50 V-nat Cr-50 Cr-52 Cr-53 Cr-54 Mn-55 Fe-54 Fe-56
Fe-57 Fe-58 Co-59 Ni-58 Ni-60 Ni-61 Ni-62 Ni-64 Cu-63 Cu-65 Ga-nat Y-89 Zr-90
Zr-91 Zr-92 Zr-94 Zr-96 Nb-93 Mo-92 Mo-94 Mo-95 Mo-96 Mo-97 Mo-98 Mo-100
Ag-107 Ag-109 Cd-106 Cd-108 Cd-110 Cd-111 Cd-112 Cd-113 Cd-114 Cd-115m Cd-116
In-113 In-115 Sn-112 Sn-114 Sn-115 Sn-116 Sn-117 Sn-118 Sn-119 Sn-120 Sn-122
Sn-123 Sn-124 Sn-125 Sn-126 Ba-138 Eu-151 Eu-152 Eu-153 Eu-154 Eu-155 Gd-152
Gd-154 Gd-155 Gd-156 Gd-157 Gd-158 Gd-160 Er-162 Er-164 Er-166 Er-167 Er-168
Er-170 Hf-174 Hf-176 Hf-177 Hf-178 Hf-179 Hf-180 Ta-181 Ta-182 W-182 W-183
W-184 W-186 Re-185 Re-187 Au-197 Pb-204 Pb-206 Pb-207 Pb-208 Bi-209 Th-230
Th-232 Pa-231 Pa-233 U-232 U-233 U-234 U-235 U-236 U-237 U-238 Np-237 Np-238
Np-239 Pu-236 Pu-237 Pu-238 Pu-239 Pu-240 Pu-241 Pu-242 Pu-243 Pu-244 Am-241
Am-242 Am-242m Am-243 Cm-241 Cm-242 Cm-243 Cm-244 Cm-245 Cm-246 Cm-247
Cm-248

The data libraries and documents are transmitted on DVD, which includes data libraries in FIDO-ANISN format. Uncompressed files are about 210 MB. Unix workstation, PC, or Mac (D00254MNYCP00).

Scale 6.1.1 Update

The Scale development team has just released Scale 6.1.1, an Update for Scale 6.1. The Update will be distributed by RSICC as a 4th DVD in the Scale 6.1 package mailed after June 4, 2012.

For details on obtaining the Update if you already have the Scale 6.1 package see:
http://scale.ornl.gov/downloads_scale6-1.shtml.

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 have catapulted their careers in science and technology. You can find it on YouTube at http://ow.ly/2EQLz.

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 bennas@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 MCNP/MCNPX RSICC license. Bring proof of receipt (letter or email) to the class.

2012 Classes for Visual Editor		
July 16-20	Introduction to MCNP/MCNPX using the MCNPX Visual Editor	Livermore, CA

2012 Classes for Visual Editor		
July 23-27	Introduction to MCNP/MCNPX using the MCNPX Visual Editor	Anaheim, CA
July 30-August 3	Intermediate MCNPX Visual Editor with a special emphasis on tallies and variance reduction	Anaheim, CA
August 6-10	Intermediate MCNPX Visual Editor with a special emphasis on tallies and variance reduction	Livermore, CA
September 10-14	Introduction to MCNP/MCNPX using the MCNPX Visual Editor	Myrtle Beach, SC
September 17-21	Intermediate MCNPX Visual Editor with a special emphasis on tallies and variance reduction	Myrtle Beach, SC
October 15-19	Introduction to MCNP/MCNPX using the MCNPX Visual Editor	Paris, France
November 5-9	Introduction to MCNP/MCNPX using the MCNPX Visual Editor	Las Vegas, NV
November 12-16	Intermediate MCNPX Visual Editor with a special emphasis on tallies and variance reduction	Las Vegas, NV

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.

MCNPX Classes 2012-13		
July 2-6	MCNP/MCNPX Intermediate Workshop	Barcelona, Spain
September 24-28	MCNP/MCNPX Intermediate Workshop	Washington, DC
October 22-26	MCNP/MCNPX Intermediate Workshop	Paris, France
January 14-18	MCNP/MCNPX Intermediate Workshop	Las Vegas, NV

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.

General Course on Monte Carlo N-Particle (MCNP) Transport Code
2012 – MCNP Class Schedule

Date	Course name and description	Location	Cost
October 29-November 2	**Introduction to MCNP6** Registration is open to all. Non-U.S. citizens must register by 8/31/12. Minimum of 8 students-Maximum of 15, Monday 12:30 p.m. - Friday 12:00 p.m.	Los Alamos, NM	$1,900 or $1,600*
December 3-7	**Variance Reduction with MCNP6** Registration is open to all. Non-U.S. citizens must register by 10/08/12. Minimum of 8 students-Maximum of 15, Monday 12:30 p.m. - Friday 12:00 p.m.	Los Alamos, NM	$1,900 or $1,600*
December 10-14	**Criticality Calculations with MCNP6** Registration is open to all. Non-U.S. citizens must register by 10/15/12. Minimum of 8 students-Maximum of 15, Monday 12:30 p.m. - Friday 12:00 p.m.	Los Alamos, NM	$1,900 or $1,600*
January 28-February 1, 2013	**Introduction to MCNP6** Registration is open to all. Non-U.S. citizens must register by 11/26/12. Minimum of 8 students-Maximum of 15, Monday 12:30 p.m. - Friday 12:00 p.m.	Los Alamos, NM	$1,900 or $1,600*

*Early payment discount: A discount of $300 per student is given when the registration payment is received in full at least 4 weeks prior to the start of 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 specifications),

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 proceeds at a much faster pace and is more in-depth than the 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 and 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 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.

NRSHOT 2012

Nuclear Reactor Simulation Hands-On Training

The Nuclear Research Group of San Piero a Grado of the University of Pisa, the Atomic Energy Research Institute, and the Innovative Systems Software are jointly organizing Nuclear Reactor Simulation Hands-On Training (NRSHOT) courses in Budapest, Hungary on June 25-29, 2012, at the Atomic Energy Research Institute.

The NRSHOT is directed toward beginner and intermediate users of System Thermal-Hydraulic Codes and 3D Neutron Kinetic Coupling.

 Further details are available at: http://www.grnspg.ing.unipi.it/nrshot/.

Further information may be requested from Alessandro Petruzzi at the following email address: a.petruzzi@ing.unipi.it or may be obtained from the seminar's homepage at http://www.grnspg.ing.unipi.it/nrshot/.

Information on accommodations and travel to the meeting venue will be provided at a later date.

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

Los Alamos National Laboratory will present a course on "Practical MCNP for the Health Physicist, Medical Physicist, and Radiological Engineer" on July 9-13, 2012, at the University of New Mexico, Los Alamos, NM, MESA Complex, Room 130. This 4.5 day course introduces the basic concepts of Monte Carlo, demonstrates how to put together a MCNP input file, and illustrates some health and medical physics applications of the code. No prior knowledge of Monte Carlo is assumed. This course is ideally suited for professionals interested in performing radiation shielding and skyshine calculations, detector simulation studies, or dosimetry. For more information about this course, visit the website at http://www.lanl.gov/orgs/rp/mcnp.shtml.

MCNPX-PoliMi Training Workshop

The Detection for Nuclear Nonproliferation Group at the University of Michigan will present the MCNPX-PoliMi Training Workshop at the University's North Campus on July 25-26, 2012. The MCNPX-PoliMi code is an enhanced version of MCNPX v. 2.7.0 that provides unique capabilities for simulating correlated-particle measurements and detector response. This two-day workshop will introduce new users to the capabilities of the MCNP-PoliMi code and acquaint experienced users with new features.

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

Workshop attendees should have software licenses for both MCNPX and MCNP-PoliMi. There are two separate licenses that are available by registration and request at the Radiation Safety Information Computational Center (RSICC) at Oak Ridge National Laboratory. Requests for the required software licenses may be made at the RSICC website at www-rsicc.ornl.gov. It is recommended that requests for the software licenses be submitted as soon as possible as the licensing procedure can take upwards of several weeks to complete.

Registration available online at http://www-ners.engin.umich.edu/labs/dnng/polimi_workshop.html. Seating is limited; therefore, the registrations will be accepted on a first-come-first-serve-basis.

Professional Development Short Courses on Radiological Assessment, Nuclear Criticality Safety, and Monte Carlo Analysis

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-47), August 13-17, 2012.

Radiological Assessment—This three-day course is based on selected topics from the 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 five 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 23, 2012**. 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-47, 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.

Fall 2012 SCALE Training Courses

Date	Title	Location	Registration Fee
Oct 8-12	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
Oct 15-19	SCALE Criticality and Shielding Course *Basic criticality calculations with KENO-VI; shielding analysis with automated variance reduction using MAVRIC; criticality accident alarm system analysis*	ORNL Oak Ridge, TN, USA	$2000
Oct 22-26	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
Oct 29-31	SCALE/ORIGEN Activation and Decay Calculations Course *Isotopic depletion/decay and source term characterization using ORIGEN/ORIGEN-ARP*	ORNL Oak Ridge, TN, USA	$1500

CONFERENCES

The International Youth Nuclear Congress 2012

The International Youth Nuclear Congress (IYNC) and the North American Young Generation in Nuclear (NA-YGN) invite you to attend the 7th IYNC in Charlotte, NC, August 5-11, 2012. The primary purpose of the Congress is to transfer knowledge from the current generation of leading scientists and engineers to the next generation. Scientific, political, public and corporate views regarding the development of different nuclear issues will be presented to provide comprehensive discussions on all sides of the subject. More information about this conference is available at http://www.iync.org/.

ICRS-12 and RPSD-2012

The 12th International Conference on Radiation Shielding (ICRS-12) and the 17th Topical Meeting of the Radiation Protection and Shielding Division of the American Nuclear Society (RPSD-2012) will be held in Nara, Japan, September 2-7, 2012. The first ICRS conference was held in 1958 at Cambridge, United Kingdom. Since then, ICRS has been held in Europe, Japan, and the United States. The ICRS series occurs every four or five years.

This conference, organized by the Atomic Energy Society of Japan, will explore the scientific, technological and engineering issues associated with particle and ionizing radiation shielding in its broadest context, including nuclear energy systems, accelerator facilities, space and other radiation

environments. It is one of the premier international radiation shielding events, regularly drawing hundreds of the world's top scientists and engineers.

The conference will open with a special session summarizing the facts and circumstances surrounding the Fukushima accident and consequent environmental assessment and recovery. The special session will complement the conference topics.

Check the website http://www.icrs12.org or contact ICRS-12 & RPSD-2012 Local Organizing Committee secretariat (office@icrs12.org) for further information.

ICFO-SI9

The 9th International Conference on Facility Operations- Safeguards Interface (ICFO-SI9) will be held on September 23-28, 2012, in Savannah, Georgia. The topical conference program committee invites individuals with professional interest in safeguards technology and nuclear material facility operations to participate. The Conference is sponsored by the American Nuclear Society Isotopes and Radiation Division, Oak Ridge/Knoxville Local Section and is cosponsored by the Institute of Nuclear Materials Management, Central Region Chapter, Southeast Chapter.

The purpose of the conference is to foster a better understanding of the relationships of operations in nuclear facilities and the application of safeguards under national and international regimes. This ninth conference in the series will provide an international forum for exchanging ideas and experiences, as well as describing progress in the areas of safeguards implementation. The conference will be timely considering the current activities to strengthen the international safeguards regime. The four and a half day conference will be held in nine half-day sessions at which policy, technical, and scientific aspects of safeguards implementation will be discussed.

Papers are encouraged in the following areas:

- Integrated design of facility safeguards systems,
- Nuclear material accountancy,
- Materials control and accountability activities,
- Measurement and instrument techniques,
- Transparency and confidence-building measures,
- Research and development in general safeguards technology,
- Extension of safeguards in light of the threat of radiological dispersal devices,
- Preparation for and implementation of the IAEA Additional Protocol,
- Safeguards by design,
- The impact of "fully information driven safeguards" on traditional safeguards,
- Advances in process monitoring, unattended measurements/monitoring, remote measurements/monitoring, and
- Application of safeguards earlier in the front end of the fuel cycle, mining and conversion.

Conference information is posted at the website at http://ICFO-9.org.

2012 CALENDAR

June

2012 ANS Annual Meeting, June 24-28, 2012, Chicago, IL, USA. Follow the website for up-to-date information, http://www.new.ans.org/meetings/c_1

- ICAPP '12, June 24-28, 2012, Chicago, IL. Contact: Lynne Schreiber, Administrator (email icapp@ans.org) url http://www.icapp.ans.org/icapp12/

- NFSM 2012 "Nuclear Fuels and Structural Materials for the Next Generation Nuclear Reactors," June 24-28, 2012, Chicago, IL. Follow the website for up-to-date information, http://www.new.ans.org/meetings/c_1

- Decommissioning, Decontamination and Reutilization and Technology Expo, June 24-28, 2012, Chicago, IL. Contact: Sue Aggarwal, Technical Program Chair (phone 303-984-5788, email saggarwal@nmnuclear.com) url http://ddrd.ans.org

July

Practical MCNP for the Health Physicist, Medical Physicist, and Radiological Engineer, July 9-13, 2012, University of New Mexico, Los Alamos, NM. For up-to-date information, visit their website at http://www.lanl.gov/orgs/rp/mcnp.shtml

8th International Topical Meeting on Nuclear Plant Instrumentation, Control and Human Machine Interface Technologies, San Diego, CA. For up-to-date information, visit their website at http://www.new.ans.org/meetings/m_124

MCNPX-PoliMi Training Workshop, July 25-26, 2012, Ann Arbor, MI, USA. Follow the website for up-to-date information, http://www-ners.engin.umich.edu/labs/dnng/polimi_workshop.html

August

IYNC2012, August 5-11, 2012, Charlotte, NC, USA. For up-to-date information, visit their website at http://www.iync.org/

September

Workshop on Computational Medical Physics, September 2, 2012, Nara Prefectural New Public Hall, Nara, Japan. The meeting agenda is available at http://www.icrs12.org/img/Workshop-CMP-announcement.pdf

ICRS-12 (12th International Conference on Radiation Shielding) and RPSD-2012 (17th Topical Meeting of the Radiation Protection and Shielding Division of the American Nuclear Society), Sept. 2-7, 2012, Nara, Japan. Contact: ICRS-12 & RPSD-2012 Local Organizing Committee secretariat (office@icrs12.org) url http://www.icrs12.org/

November

2012 ANS Winter Meeting and Nuclear Technology Expo, Nov. 11-15, 2012, San Diego, CA, USA

Embedded Topical Meetings:

- Advances in Thermal Hydraulics (ATH'12)

- International Meeting on Severe Accident Assessment and Management: Lessons Learned from Fukushima Dai-ichi

For up-to-date information, visit their website at http://www.new.ans.org/meetings/c_1.