Radiation Safety Information Computational Center

No. 553   **March 2011**

To be ignorant of the lives of the most celebrated men of antiquity is to continue in a state
of childhood all our days.—Plutarch

The entire staff of RSICC is very saddened by the natural disasters that have occurred in Japan and New Zealand during the past month. Our sympathy and prayers are with those who have suffered the loss of family, friends, and livelihood. It is our hope that those who are involved with rescue and recovery continue to do so in safety and with determination.

Women in Nuclear Region II Conference

The Women in Nuclear Region II conference on Mini Reactors - Mighty Neutrons was held at Oak Ridge National Laboratory (ORNL), February 6–9, 2011. The event, hosted by ORNL and the Tennessee Valley Authority (TVA), drew over 200 women from the Southeast region representing many nuclear industry and research organizations. Attendees heard presentations on small modular reactors, nuclear fuels, human retention, nuclear policy and nuclear security and had the opportunity to tour ORNL facilities, including the Spallation Neutron Source (SNS), High Flux Isotope Reactor (HFIR), Radiochemical Engineering Development Center (REDC) and the Safeguards Lab. TVA also provided tours of the Watts Bar facility. Congressman Chuck Fleishman (Tenn.) introduced the keynote speaker,

Congressman Marsha Blackburn (Tenn.) who spoke in support of nuclear power as a solution to the clean energy needs United States.

The enthusiasm shown by the participants is an indicator of the potential of the nuclear industry. The number of women in nuclear industry as well as their involvement is growing. The Women in Nuclear (WIN) organization provides a platform for community outreach and political influence for those interested in promoting nuclear power and the nuclear industry as a whole. For more information on Women in Nuclear, go to www.winus.org.

Marilyn Brown, Professor, School of Energy Policy, Georgia Institute of Technology and TVA Board of Directors, was a keynote speaker at WIN II conference.

Geant4/SWORD Training Workshop

Approximately 60 participants representing industry, education, and government laboratories, both in the U.S. and abroad, arrived at Oak Ridge National Laboratory for a Geant4/SWORD training workshop. Lori Jackson, Chul S. Gwon, and Elena Novikova, members of the SWORD development team at the Naval Research Laboratory, presented an overview of SWORD (SoftWare for Optimization of Radiation Detectors) on Monday. The balance of the week offered an intense program devoted to Geant4 (GEometry ANd Tracking) led by Makoto Asai, Tatsumi Koi, Joseph Perl, and Dennis Wright of the SLAC National Accelerator Laboratory. The participants are pictured below.

ATR NSUF Experiment Opportunity

The ATR NSUF at Idaho National Laboratory offers rapid turnaround experiments (RTE) that typically can be performed quickly. The call for rapid turnaround experiments is open throughout the year. Proposals are reviewed as they are received, and the proposer is typically notified of the status within a month of submittal.

With the recent opening of the Microscopy and Characterization Suite (MaCS) at the Center for Advanced Energy Studies (CAES) the NSUF now has access to a new:

- Focused Ion Beam with EDS/EBSD/Omniprobe
- Local Electrode Atom Probe (LEAP)
- Nano Indenter Atomic Force Microscope
- Scanning Electron Microscope with EDS/EBSD/CL
- FEI Tecnai TF30-FEG STwin STEM

All of these instruments can handle samples with a limited amount of radioactivity. As this equipment is new and we have more open time than users we strongly encourage you to submit a rapid turnaround proposal. While no travel support is available for RTEs, a successful proposal gains access to the equipment free of charge.

For more information on the equipment in the MaCS suite at CAES, please click on the following link: https://inlportal.inl.gov/portal/server.pt/community/caes_microscopy_and_characterization_suite/709/instrumentation.

As with all ATR NSUF experiments, a thorough technical review, along with program relevancy reviews will be completed to determine whether the research is eligible for award. Once awarded, principal investigators will work directly with the CAES facility to establish a time for performing the experiment.

Mary Catherine Thelen

International Nuclear Safeguards Policy Internships at LLNL

CNS and Lawrence Livermore National Laboratory are pleased to announce the availability of up to six paid summer internships at Lawrence Livermore National Laboratory in Livermore, California. These internships are designed to provide students with the experience of working on nuclear nonproliferation and safeguards policy issues in the national laboratory environment. The centerpiece of the internship is a safeguards policy research project that the student will complete in consultation with a LLNL staff mentor. Additionally, students will see first-hand the intersection of nuclear safeguards policy and technology issues by touring LLNL facilities and consulting with technical and policy staff and participate in multi-laboratory safeguards training to learn about safeguards issues from a variety of national laboratory experts.

To be eligible for these internships, applicants must be a U.S. citizen and currently enrolled as graduate or upper-division undergraduate students (spring/summer 2010 graduates are eligible as well). Students selected for internships will be provided with a monthly $3,000 stipend to cover basic expenses (e.g. accommodation, meals, and incidentals). Previous course work or practical experience working in the area of nuclear nonproliferation is a plus but not required. Students selected for these internships must attend the intensive course on international safeguards policy and information analysis referenced above. The deadline for applications for internships is **April 1, 2011**. Please the CNS website for more information and instructions on how to apply.

For more information on the international nuclear safeguards policy course and internships, please contact Edith Bursac (ebursac@miis.edu) at the James Martin Center for Nonproliferation Studies.

Haghighat Transfers to Virginia Tech

Having reestablished its nuclear engineering program in 2007, Virginia Tech has wooed Alireza Haghighat from his post as the Florida Power and Light Endowed Term Professor at the University of Florida. At the Florida campus, he started as the chair of the nuclear and radiological engineering department in 2001, and spent eight years in this position. His responsibilities at Virginia Tech began in January 2011. Dr. Haghighat, a Fellow of the American Nuclear Society, currently serves as the chair of the board of the Southeast Universities Nuclear Reactors Institute for Science and Education.

Haghighat is recognized internationally for his research in particle transport methods and their applications in the simulation of nuclear systems, parallel computing for nuclear applications, Monte Carlo methods, reactor physics, perturbation techniques, design of nondestructive interrogation systems for homeland security applications, simulation of nuclear reactors, radiation systems, and medical devices. Also, he has been involved in design and licensing of digital control and protection systems for nuclear reactors.

"We are extremely fortunate to attract Dr. Haghighat to our campus. I first met him when we were both on the faculty at Penn State in 1977. He was one of the most productive faculty members in the college of engineering," said Richard C. Benson, dean of Virginia Tech's College of Engineering.

Ken Ball, head of Virginia Tech's mechanical engineering department, who has expertise in special nuclear materials and engineering, also spoke of Haghighat's many accomplishments. He said, "With a man of his talents joining our nuclear program, our long term vision to create an interdisciplinary program in nuclear science and engineering across three colleges will happen much faster."

RSICC has enjoyed a productive relationship with Alireza and wish him and Virginia Tech well on this new endeavor.

Press release, Blacksburg, VA, February 21, 2011
Virginia Tech College of Engineering

Gutteridge Retires

John Gutteridge retired at the end of 2010 after 37 years of service to the U.S. Department of Energy (DOE) and the U.S. Nuclear Regulatory Commission (NRC). During 12 years at the DOE and NRC he helped to secure funding to help advance university nuclear technology education. To acknowledge John's commitment to the support of university nuclear programs, the Nuclear Engineering Department Heads Organization (NEDHO) presented him with a plaque which reads, "Presented to John Gutteridge in recognition of his extraordinary personal commitment to nuclear engineering education and university nuclear engineering programs. Over 5000 nuclear engineers graduated during John's tenure; each one benefited in some measure from his efforts. Untold numbers of educators and students at all levels have been influenced by his outreach programs. He has truly changed the face of nuclear engineering education."

Gutteridge leaves the NRC's educational programs in good shape and feels that DOE is doing a good job reinvigorating its educational programs. We at RSICC have enjoyed a mutually beneficial relationship with John and wish him a long and satisfying retirement. He will not be idle as a retiree.

You may read more about John's public career in the January 2011 edition of *Nuclear News*.

CHANGES TO THE RSICC CODE AND DATA COLLECTION

CCC-777/COG 11

Lawrence Livermore National Laboratory, Livermore, California, contributed COG, a modern, full-featured Monte Carlo radiation transport code that provides accurate answers to complex shielding, criticality, and activation problems. COG was written to be state-of-the-art and free of physics approximations and compromises found in earlier codes. COG is fully 3-D, uses point-wise cross sections and exact angular scattering, and allows a full range of biasing options to speed up solutions for deep penetration problems. Additionally, a criticality option is available for computing Keff for assemblies of fissile materials. ENDL or ENDFB cross section libraries may be used.

Cross section libraries are included in the package. COG can use either the LLNL ENDL-90 cross section set or the ENDFB/VI set. Analytic surfaces are used to describe geometric boundaries. Parts (volumes) are described by a method of Constructive Solid Geometry. Surface types include surfaces of up to fourth order, and pseudo-surfaces such as boxes, finite cylinders, and figures of revolution. Repeated assemblies need be defined only once. Parts are visualized in cross-section and perspective picture views. A lattice feature simplifies the specification of regular arrays of parts. Parallel processing under MPI is supported for multi-CPU systems.

Source files are not included in this package. COG is operable on PCs running either Windows or Linux Operating Systems. COG is distributed on DVD. Included are executables for Windows and Linux, data libraries, test cases and documentation. Reference: UCRL-TM-202590, 5th Edition (Sept. 2002). Fortran 77 (98%), C(2%); Personal computers (C00777MNYCP00).

PSR-477/TRAC-PF1-EN/MOD3

Synthesis Srl, Milano, Italy, through the NEA Data Bank, Issy-les-Moulineaux, France, released TRAC-PF1-EN/MOD3. TRAC-PF1-EN/MOD3 is a combined computer program comprising a revised version of the TRAC-PF1 transient reactor analysis code and a specially implemented three-dimensional two-group neutron kinetics code (QUANDF). Starting from either a critical steady-state (k-effective or critical dilute boron problem) or a subcritical steady-state (fixed source problem) in a PWR plant, the code allows one to simulate the neutronic and thermal-hydraulic core transient response to reactivity accidents initiated both inside the vessel (such as a control rod ejection) and outside the vessel (such as the sudden circulation of a stagnant slug of unborated water), involving all of the primary system individual components. Minor modifications were made to this release.

To run TRAC-PF1-EN/MOD3 requires a PC with 486 or Pentium processor and at least 16 Mb of RAM and a WINDOWS Operating System with MS Fortran Power Station Compiler version 1.0 or higher or LINUX or Unix with a F77 compiler. Included in a self-extracting executable file are the referenced documents, Fortran source files, and the input/output files for the three sample problems. Fortran 77; PC X86 (P00477PCX8601).

PSR-548/TALYS

TALYS 1.2 was contributed by the NRG - Nuclear Research and Consultancy Group, Petten, The Netherlands, and CEA Service de Physique et Techniques Nucleaires, Bruyeres-le-Chatel, France, through the OECD NEA Data Bank, Issy-les-Moulineaux, France. TALYS is software for the simulation of nuclear reactions. Many state-of-the-art nuclear models are included to cover all main reaction mechanisms encountered in light particle-induced nuclear reactions. TALYS provides a complete description of all reaction channels and observables. It is a versatile tool to analyze basic microscopic experiments and to generate nuclear data for applications.

TALYS was tested under RedHat Enterprise Linux with GNU (gcc) 4.3, MacOS 10.5.8 with gfortran 4.3 and PGI 7.2 compilers and Windows 7 with Intel 11.1 compilers. A Fortran compiler is required; no executables are included in the package. The package is transmitted on one DVD including documentation, source code, scripts, nuclear structure database and sample problems. Reference: User Manual (December 22, 2009). Fortran 95; PC Linux (P00548PC58601).

PSR-563/FEAST-METAL

FEAST-METAL-V.1.0, a Fuel Engineering and Structural Analysis Tool, was contributed by the U.S. Nuclear Regulatory Commission, Washington, DC, USA. FEAST-METAL is a fuel performance code developed for predicting steady state and transient behavior of U-Pu-Zr metallic fuel alloys with stainless steel clad in sodium fast reactor environments. The code currently adopts HT9 cladding properties. The code includes several physics based semi-empirical continuum level models to predict various important phenomena occurring under normal and off-normal scenarios. Details of the physical models can be found in the references.

Packaged in a single zip file containing source code, precompiled executables for Windows systems, two sample problems and documentation. Fortran90 (P00563MNYCP00).

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

Introductory MCNP, Advanced MCNP, 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.

2011 Classes		
April 11–15	Introduction to MCNP using the MCNPX Visual Editor	Las Vegas, NV
April 18–22	Intermediate MCNP Visual Editor with a special emphasis on tallies and variance reduction	Las Vegas, NV
June 6–10	Introduction to MCNP using the MCNPX Visual Editor	Anaheim, CA
June 13–17	Intermediate MCNP Visual Editor with a special emphasis on tallies and variance reduction	Anaheim, CA
September 12–16	Introduction to MCNP using the MCNPX Visual	Myrtle Beach, SC

2011 Classes		
	Editor	
September 19–23	Intermediate MCNP Visual Editor with a special emphasis on tallies and variance reduction	Myrtle Beach, SC
October 24–28	Introduction to MCNP using the MCNPX Visual Editor	London, U.K.
November 7–11	Introduction to MCNP using the MCNPX Visual Editor	Las Vegas, NV
November 14–18	Intermediate MCNP Visual Editor with a special emphasis on tallies and variance reduction	Las Vegas, NV

The introductory classes combine teaching on MCNP physics, along with instructions on how to use the Visual Editor. The advanced class assumes the user has experience using MCNP or MCNPX and focuses on Visual Editor topics. Computer demonstrations and exercises will focus on creating and interrogating input files with the Visual Editor. Advanced visualization work using MCNP will also be demonstrated. Both the introductory and advanced classes will be taught on Pentium computers running Windows 2000. Attendees are encouraged to bring their own input files for viewing and modifying in the visual editor. The course description and registration information can be found at http://www.mcnpvised.com/index.html.

MCNPX Training

2011 Classes		
May 9–13	MCNPX Intermediate Workshop	Chicago, IL
September 26–30	MCNPX Intermediate Workshop	Washington, DC
October 17–21	MCNPX Intermediate Workshop	London, U.K.

The MCNPX team at Los Alamos National Laboratory offers interactive workshops for training users in the capabilities of MCNPX. Three levels are offered:

- introductory (for users with 0–1 year of experience),
- intermediate (for users with 1–3 years of experience), and
- advanced (for users with more than 3 years of experience).

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 15 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, indicating the workshop of interest to you.

SCALE Training Courses

Date	Title / Description	Location
April 11–15	**SCALE Criticality Safety and Shielding Course** Introduction to criticality safety using the generalized geometry version of KENO, shielding analysis using automated variance reduction for deep-penetration and complex problems, and criticality accident analysis system analysis (**KENO-VI**/**MAVRIC**)	ORNL, Oak Ridge, TN
April 18–21	**Special Topics in SCALE Analysis** A new course in burnup credit analysis for transportation casks and fuel storage racks using OrigenArp, STARBUCS, and TRITON)	ORNL, Oak Ridge, TN

A discount of $200 will be applied for registration of multiple courses. Class size is limited and courses may be canceled if minimum enrollment is not obtained one month prior to the course. Course fees are refundable up to one month before each class. Note that all attendees must be registered SCALE 6 users. All foreign national visitors must register a minimum of 40 days prior to the start date of the training course they plan to attend. Course descriptions may be found at http://www.ornl.gov/sci/scale/course_description.htm.

ENEN Courses

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

Operation & Safety of PWR—May 16–27, 2011

The objective is to develop the working skills for design, operation, and safety of pressurized water reactors (PWR) with basic knowledge of thermal-hydraulics and core physics to support the technical aspects of PWR architecture, systems, and control and management procedures.

Thermal Hydraulics of Light Water Reactors—June 14–24, 2011

The course will provide the fundamentals of reactor thermal hydraulics, including single-and two-phase flows, heat and mass transfer phenomena and fuel thermal behavior. Design and safety of light water reactors is addressed, particularly thermal and hydraulic limitations.

Contact: Nadia Nowacki at

The European Nuclear Education Network Association (ENEN)
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International Nuclear Safeguards Summer Course

The James Martin Center for Nonproliferation Studies (CNS) in cooperation with Lawrence Livermore National Laboratory and with support of the U.S. Department of Energy National Nuclear Security Administration's Next Generation Safeguards Initiative, will offer an intensive one-week course on international nuclear safeguards policy.

This professional development course, to be held at the Monterey Institute of International Studies May 23–27, 2011, will provide background knowledge and introduce tools needed for careers in nuclear safeguards with an emphasis on policy and information analysis. This course will be led by senior CNS and Monterey Institute staff with presentations by experts from U.S. national laboratories and other leading nonproliferation and safeguards specialists.

The course is offered free of charge, and currently enrolled graduate students, upper division undergraduate students, recent university graduates, and young professionals in fields related to nuclear nonproliferation are eligible to apply. A small number of $500 stipends to cover travel and living expenses during the course are available to students outside of the Monterey area who can demonstrate financial need. The deadline for applications for the course is **April 1, 2011**. Please see the CNS website for more information and instructions on how to apply.

MMCTP Users Course

A one-day course on MMCTP, sponsored by the Medical Physics Unit at McGill University, is scheduled for June 11, 2011, at Montreal General Hospital, in Montreal, Canada. Workshop is limited to 12 participants; the registration deadline is April 29, 2011. Details regarding the workshop can be found at http://www.medphys.mcgill.ca/~mmctp/MMCTP/course/MMCTPCourse/Welcome.html.

MMCTP is a radiotherapy research environment built for students and researchers to plan and calculate complex Monte Carlo treatment plans. MMCTP makes use of the popular BEAMnrc code for modeling linear accelerators and DOSXYZnrc for modeling the patient geometry.

The course will train individuals on the use of MMCTP with the intent that they will be able to return to their institutions with the knowledge required to implement MMCTP. The workshop will include lectures and hands-on laboratories. Attendees are required to bring along a laptop (Windows or MAC) to participate in the hands-on laboratories.

MeV Summer School

The 2011 MeV Summer School on Reactor Physics Computations, Validation and Integration in Multiphysics Codes will be held July 19-28, 2011, at the Advanced Photon Source (APS) Facility at Argonne National Laboratory. The school is once again co-sponsored by the Idaho National Laboratory (INL), Idaho State University (ISU), and Argonne National Laboratory (ANL). This year the Center for Advanced Energy Studies (CAES) and Oak Ridge National Laboratory (ORNL) are also co-sponsors. The objective of the school is to provide early career nuclear engineers with advanced studies in integrated modeling, experimentation, and validation to prepare them for some of the key challenges and demands facing the nuclear energy renaissance. The 2011 focus is Reactor Physics Computations, Validation and Integration in Multiphysics Codes and includes the following major topics:

- reactor physics modeling and analysis methods;
- nuclear data theory, measurements, and evaluation;
- multiphysics (thermal hydraulics, neutronics, materials, fuels, i&c) of plant dynamics in operational, abnormal transients and accidents;

- basics and advances in nuclear energy systems modeling and simulation that encompasses critical review of equations and numerical methods;
- experimental measurements of reactor physics behavior;
- sensitivity analysis, uncertainty quantification and data assimilation methods; and
- advanced verification and validation methods.

Students will be grouped in teams to work on course assignments that build on the lecture materials and address challenging questions in reactor physics and safety. Each team will be working closely with and mentored by senior scientists and professors who are leaders in the field. Successful students will take away a solid theoretical foundation as well as a set of practical examples to guide their future work on experimental design, model development, and validation. Classroom instruction will be augmented by tours to the Exelon Dresden Generation Station (nuclear plant) in Morris, Illinois, and to the Advanced Photon Source (APS) Facility at Argonne National Laboratory. Registration, schedule, and other important information are posted at the website, http://mevschool.org/.

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. Materials 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.

CONFERENCES

International Conference on Transport Theory (ICTT-22)

The 22nd International Conference on Transport Theory will be held in Portland, Oregon, September 11–15, 2011. The intent of the conference is to bring together researchers in the several fields of engineering and science who use similar, or identical, mathematical methods in their studies, meaning

those which evolved from the Boltzmann transport theory. Abstracts are due via email to ictt22@oregonstate.edu by **May 1, 2011**. The topics for the conference 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, and
- radiative transfer - fluid-dynamics.

All conference information will be posted to the 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 meet to discuss, analyze and study the latest developments in the area of nuclear criticality safety. Complete 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 LtdPO Box 406West 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. Papers may be submitted on the website by **April 29**.

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 to the quality of life in our society.

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

May 2011

2nd National Conference on Advancing Tools and Solutions for Nuclear Material Detection, May 2–3, 2011, Salt Lake City, UT. Contact: Tatjana Jevremovic,Nuclear Engineering Director, University of Utah 2298 MEB, 50 South Central Drive, University of Utah, Salt Lake City, UT 84112 (phone 801-587-9696, email Tatjana.Jevremovic@utah.edu) url http://www.nuclear.utah.edu/conference.

ICAPP 2011, May 2–5, 2011, Nice, France. Contact: Sylvie Delaplace, SFEN (phone 33 0 1 53 583216, fax 33 0 1 53533211, email icapp2011@sfen.fr) url www.sfen.fr/index.php/plain_site/icapp_11.

MC 2011, May 8–12, 2011, Rio de Janeiro, Brazil. Meeting information: http://www.mc2011.org/.

Canadian Radiation Protection Annual Conference, May 8–12, 2011, Ottawa, Ontario, Canada. Contact CRPA (phone 613-253-3779, fax 888-551-0712, email secretariat2007@crpa-acrp.ca) url www.crpa-acrp.com/en.

NESTet 2011, May 15–18, 2011, Prague, Czech Republic. Contact Contact: Kirsten Epskamp, ENS (phone 32 2 505 30 54, fax 32 2 505 3902, email nestet2011@euronuclear.org) url www.euronuclear.org/events/nestet/nestet2011/.

ICENES 2011, May 15–19, 2011, San Francisco, CA. Contact: ICENES 2011 (phone 925-423-4372, fax 925-424-3495) url www.icenes2011.org.

ICONE19, May 16–19, 2011, Makuhari, Chiba, Japan. Contact: JSME (email icone19@jsme.or.jp) url www.icone19.org or www.asmeconferences.org/icone19/.

Jahrestagung Kerntechnik (Annual Meeting on Nuclear Technology 2011), May 17–19, 2011, Berlin, Germany. Contact: CPO Hanser Service (phone 49 30 300 6690, fax 49 30 305 7391, email jtkerntechnik2011@cpo-hanser.de) url www.kerntechnik.info/en/home.html.

European Nuclear Young Generation Forum (ENYGF), May 17–22, 2011, Prague, Czech Republic. Contact: ENYGR (email info@enygt.eu) url www.enygf.eu.

ISRD-14, May 22–27, 2011, Bretton Woods, New Hampshire. Contact: Dr. David W. Vehar, Sandia National Laboratories (dwvehar@sandia.gov) url http://www.reactordosimetry.com/.

Nuclear 2011, May 25–27, 2011, Piteşti, România. Contact: Cristina Alice Margeanu, Reactor Physics, Nuclear Fuel Performances and Nuclear Safety, Institute for Nuclear Research Piteşti #1, Campului Street, Mioveni, 115400, Romania (phone +40 248 213 400; fax +40 248 262 449) url http://www.nuclear.ro.

June 2011

Workshop on Activation Data (Kopeck), June 1–3, 2011, Charles University in Prague, Czech Republic. Contact: Jean-Christophe.Sublet@ccfe.ac.uk, url http://www.ccfe.ac.uk/EASY_workshops.aspx.

32nd Canadian Nuclear Society Annual Conference and 35th CNS Student Conference, June 5–8, 2011, Niagara Falls, Ontario, Canada. Contact: CNS (phone 416-977-7620, email cns-snc@on.aibn.com) url http://conf2011.cns-snc.ca.

ANS Annual Meeting, June 26–30, 2011, Hollywood, FL. The website is http://www.new.ans.org/meetings.

IRRMA-8, Industrial Radiation and Radioisotope Measurement Applications, June 26–July 1, 2011, Kansas City, MO. Contact: William L. Dunn, Kansas State University (email dunn@k-state.edu) url http://www.dce.k-state.edu/conf/irrma/.

September 2011

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.

ICTT-22, 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/.

ICNC2011, 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.

October 2011

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.