Oak Ridge National Laboratory

SCALE Newsletter

Number 29   January 2004

Special points of interest:

- SCALE 5 release set for March 2004

- SCALE 5 workshops in April and May 2004, including burnup credit

Inside this Issue:

SCALE 5: Coming Soon

The widely anticipated release of SCALE 5 is rapidly approaching. The original target of December 2003 proved to be overly optimistic, but over 90% of the software has been tested and placed under configuration control. Currently the SCALE staff is working to complete the software testing, configuration control, and documentation. The present estimate is that SCALE 5 will be available from RSICC in March 2004. Users are encouraged to join the SCALE News E-mail List. These users will be notified the day that SCALE 5 is available.

 KENO3D has been upgraded and a 30-day evaluation version will be included in the SCALE 5 package. SCALE 5 users who want to purchase a license for the complete version of KENO3D will be able to do so online without having to order a separate package from RSICC.

Updates to ORIGEN-S Data Libraries

 Several important changes in ORIGEN-S and its associated data libraries have been made recently. These updates will be included in the SCALE 5 release.

- A new PWR cross-section library has been created. ENDF/B-VI fission yields for 30 actinides have been added. In addition, the new library **completely** replaces the historical cross section

parameters carried over from the original ORIGEN code and more than doubles the number of nuclides with reaction cross sections. The fission product library is increased from 879 to 1119 nuclides. The new cross sections are derived from ENDF/B-VI, FENDL, and EAF evaluations, collapsed using AMPX-2000 with a continuous energy flux spectrum from CENTRM for mid-life PWR fuel conditions.

- The Master Photon Library line data are upgraded with modern evaluations, increasing the number of nuclides with photon yields from approximately 400 to 2100.

- The new cross section formats of the card-image library are dramatically revised for better readability and maintenance. Binary library formats are unchanged.

- The thermal neutron group boundary is moved from 0.5 eV to 0.625 eV, an energy boundary available in most transport libraries.

- The epithermal cross section values in the library are now true group-averaged cross sections. The resonance integral is replaced by group average cross sections from 0.625 eV to 1 MeV, and fission-spectrum-averaged cross sections are replaced with group averages above 1

MeV. The thermal cross section is still the 2200-m/s value.

- The definitions for RES and FAST have changed. They now represent the ratio of the intermediate and fast fluxes to the thermal flux. Changes have been made in COUPLE and SAS2H to handle the new definitions of RES and FAST.

New Shielding Cross-Section Library Capability in SCALE 5

 The SCALE 5 version of ICE can now make cross sections for the DORT/TORT and DANTSYS radiation shielding packages.
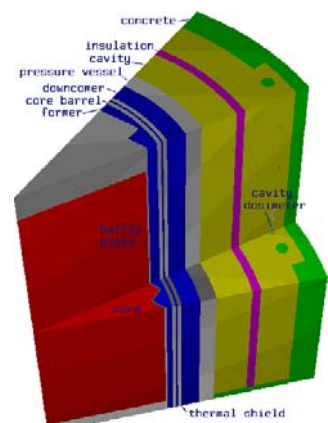
SCALE Training Course Schedule for 2004

SCALE Training Courses—for more information, please go to our web site www.ornl.gov/scale/trcourse.html

The SCALE staff is offering three SCALE 5 training courses this spring. The courses will emphasize hands-on experience solving practical problems on PCs. Courses are open to both new and experienced SCALE users. Classes are cosponsored by RSICC. RSICC offers a discounted price of $200 (single user license) to all attendees for the SCALE 5 software and manual on CD.

Additional training courses are planned for later in 2004. A TSUNAMI sensitivity/uncertainty course is planned, and a TRITON/NEWT course is being considered. The traditional KENO V.a and Source Terms & Shielding Courses will be offered in the fall.

Registration forms should be submitted from the SCALE website. Registration via FAX is available, if necessary. The registration fee may be paid by check, bank transfer, or credit card (VISA or MasterCard). Course agendas and descriptions are included below. Class size is limited and courses are subject to cancellation if minimum enrollment is not obtained one month prior to the course. Course fees are refundable up to one month before each class.

Date	Title	Registration Fee*	Description
April 26-30, 2004	KENO-VI	$1800	Criticality safety using the generalized geometry version of KENO.
May 3-4, 2004	ORIGEN-ARP/SAS2	$1200	Isotopic depletion/decay for source terms, decay heat, and high-level waste/spent nuclear fuel characterization.
May 5-7, 2004	STARBUCS (experienced KENO users or attended the KENO-VI course the previous week)	$1200	Automated burnup credit analysis using ORIGEN-ARP and KENO (V.a or VI).

*Registration must be submitted by March 26, 2004. After that date a surcharge of $300 will be added to the fee. A total discount of $600 will be applied for registration to two courses or $1000 to all three courses.

**KENO-VI
Course Agenda
(April 26-30, 2004) ORNL**

Monday
Overview of SCALE System
Introduction to CSAS
Standard Composition Library
Material Information Processor
Resonance Self-Shielding
Unit Cell Geometry - Lattice Cell/Multiregion
GeeWiz Tutorial
Problem Session 1

Tuesday
KENO Parameters
KENO-VI Geometry
KENO Plot Data
Introduction to KENO-VI Output
Problem Session 2

Wednesday
KENO3D Tutorial
Geometry Modification Data
KENO-VI Array Data
KENO-VI Content Data
Problem Session 3

Thursday
KENO-VI Output - How to Read It
Mixing Table Data
Start Data
Bias Data
Boundary Data
Problem Session 4

Friday
Monte Carlo Uncertainties
Code and Data Validation Issues
Conclusion / Questions and Answers

**The course will conclude at noon on
Friday**.

**ORIGEN-ARP/SAS2
Course Agenda
(May 3-4, 2004) ORNL**

Monday
Overview of SCALE System
ORIGEN-ARP
Plotting ORIGEN Results with OPUS/
PlotOPUS
How to Create ORIGEN-ARP Libraries
OriginArp/PlotOPUS Tutorial
ORIGEN-ARP Problem Definitions
ORIGEN-ARP Problem Session

Tuesday
Material Information Processor
SAS2 Depletion/Decay/Source Terms
Analysis Sequence
SAS2 Problem Definitions
SAS2 Problem Session

**SCALE STARBUCS Burnup Credit
Course Agenda
(May 5-7, 2004) ORNL**

Wednesday
SAS2H: Theory, Capabilities, and Limitations
Introduction to STARBUCS
STARBUCS Problem Session 1

Thursday
Advanced STARBUCS Options
STARBUCS Problem Session 2

Friday
Introduction to TRITON: 2-D Fuel Lattice
Depletion Sequence

The course will conclude at noon on

For more information and online registration, please visit www.ornl.gov/scale/
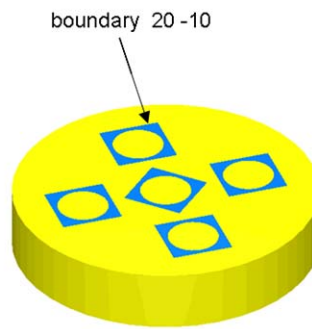
Words to the Wise

HOLE Boundary Definition Vector Limitation for KENO-VI

The KENO-VI documentation in the SCALE 4.4a manual implies that any unit may be placed as a HOLE in another unit as long as it is entirely contained within the unit and does not intersect other HOLES. An additional limitation exists for units placed in HOLES.
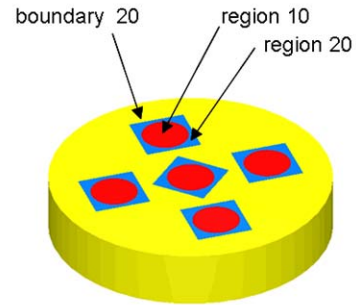
The boundary definition vector of a unit that is placed in a HOLE must have no negative values (a negative value specifies that the boundary is outside a given geometry region). Multiple geometry labels may be contained in the unit boundary definition vector as long as they are all positive (i.e., the boundary is inside all specified geometry regions). A negative value in the boundary definition will result in an incorrect region that contains the HOLE. In such a case, one of the following will occur: (1) the problem will terminate with an undefined region; (2) the problem will terminate with a multiply defined region; or (3) the problem will run but produce an incorrect result.

Invalid hole boundary

boundary 20 -10

Valid hole boundary

boundary 20   region 10
region 20