

ENDF/B-VIII.1 and AMPX

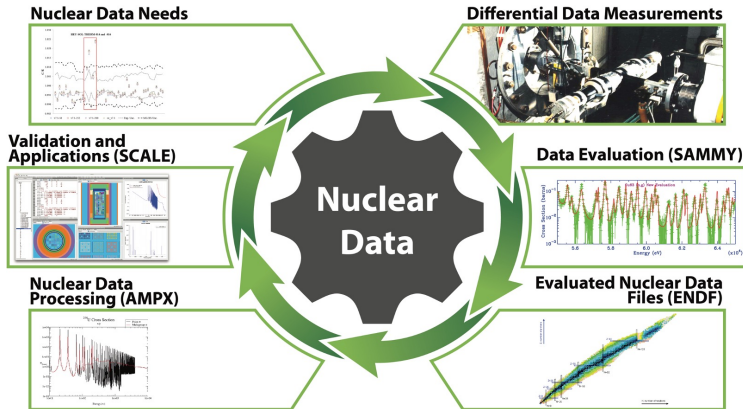
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SCALE Users' Group Workshop. April 26, 2023

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OVERVIEW

- Brief introduction to the AMPX nuclear data processing code
- Nuclear data libraries that ship with the SCALE code system
- Preparations for the ENDF/B-VIII.1 libraries

AMPX in the SCALE Code System



AMPX is the code that processes nuclear data libraries for use in applications by the SCALE code system.

AMPX in the SCALE Code System

The modules within AMPX coordinate to produce the data libraries utilized by SCALE.

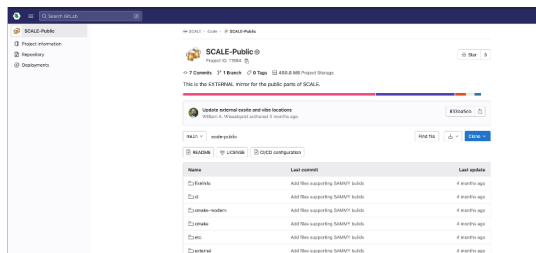
- MG Libraries
 - polident, y12, x10, simonize, ajax
- CE Libraries
 - polident, y12, jamaican, platinum
- Covariance Libraries
 - puff_iv, cognac, cadillac

Current and ongoing efforts in AMPX

An open source subset of SCALE, including AMPX, is available at <https://code.ornl.gov/scale/code/scale-public>.

All components of AMPX can be built and utilized.

The AMPX GUI, ExSite, may be found at <https://code.ornl.gov/scale/code/external/exsite>.



This open-source subset of SCALE is available as a beta release, and is subject to change.

Current and ongoing efforts in AMPX

- Support of GNDS format for evaluated nuclear data files
 - A publicly available module that supports reading the GNDS format has been released
- Enhancements to handling of TSL data
 - One challenge – The TSL evaluation libraries include more materials and more detail than before, which requires care in processing
- Processing of the photonuclear sublibrary
 - In support of the NioWave–NNSA partnership in the design and assessment of accelerator-driven subcritical systems, especially to generate ^{99}Mo

SCALE 6.3 DATA

- ENDF/B-VII.1
 - Corrected probability tables for subset of evaluations
 - New coupled MG libraries, xn252g47v7.1 and xn56g19v7.1
 - New Sodium-cooled Fast Reactor (SFR) MG library (302 groups)
 - Covariance data in 56 groups
 - 56 group perturbation libraries for SAMPLER
- ENDF/B-VIII.0
 - 252 (thermal) and 302 (SFR) group MG libraries
 - New coupled MG libraries, xn200n47g and xn28n19g
 - CE library now distributed in HDF5 format
 - Covariance data in 56 groups
 - 56 group perturbation libraries for SAMPLER

SCALE 7.0.0 AMPX Multigroup Library Development

- AMPX multigroup libraries
 - SCALE 6.3.0 reactor physics: 56-, 252-, and 302-groups
 - VERA MPACT 51- and 60-group libraries
- Energy group optimization
 - 5 eV $\rightarrow$ 10 eV thermal cutoff energy
 - New 258-group structure for HTGR
 - New 61-group structure, a subset of the 258-group structure

Preparation for ENDF/B-VIII.1

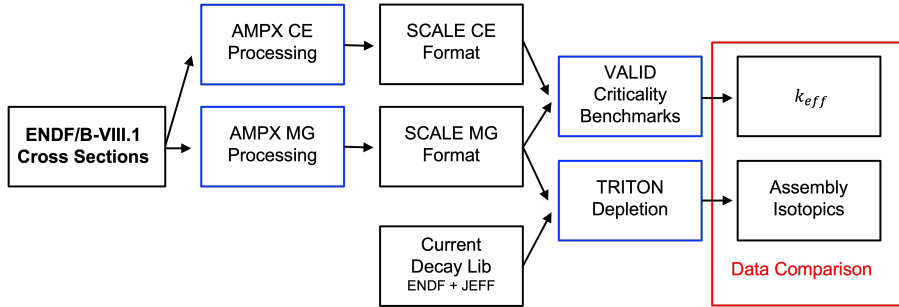
The ENDF/B-VIII.1 evaluation library beta was released in March 2023.

The SCALE data team is processing these libraries for use in SCALE, especially to provide valuable feedback to the nuclear data community during ENDF/B-VIII.1 testing.

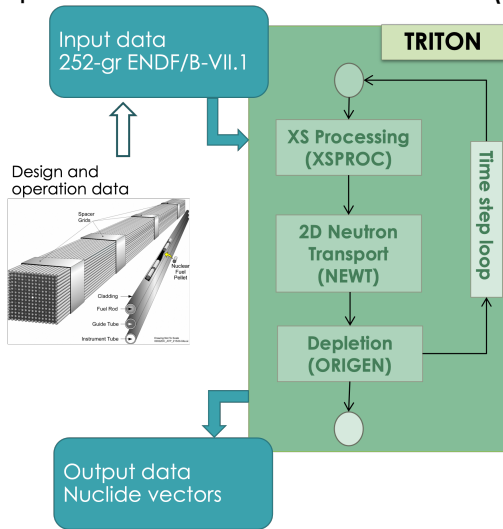
- More isotopes have higher fidelity covariance data, which will enhance analyses with SCALE TSUNAMI
- Updated actinide evaluations in order to address issues in depletion studies
- More thermal moderator materials are included

Preparation for ENDF/B-VIII.1 (cont'd)

- Rigorous beta-release testing and discussions ongoing (this week!)
- ORNL will test beta releases with many applications:
 - VALID suite of ICSBEP benchmarks
 - Depletion cases from operating reactors
 - Fast-burst decay heat



Preparation for ENDF/B-VIII.1 (cont'd)



VALID

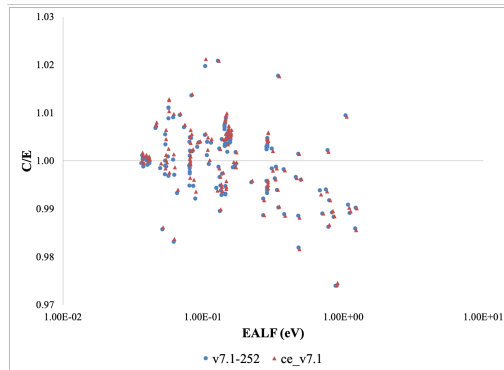


Figure 51. C/E as a function of EALF for 2 ENDF/B-VII.1 libraries.

CONCLUSIONS

- AMPX is the code that processes nuclear data libraries for the SCALE code system.
- SCALE 6.3.0 ships with multigroup and continuous energy transport libraries, covariance libraries, and decay resources based on both ENDF/B-VII.1 and ENDF/B-VIII.0.
- The ENDF/B-VIII.1 evaluated libraries have been released in a beta stage (March 2023) – work is ongoing to process these libraries for SCALE 7.0.0.

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