AMPX Developments in FY2022

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SUMMARY

• AMPX is now available as open source!
• Overview about ENDF and GNDS reading in AMPX
• Thermal Scattering Law Updates
• CE and MG Data Libraries for SCALE 6.3.0 and SCALE 7.0.0
• Photonuclear Sublibrary Processing Capability
OPEN SOURCE AVAILABILITY

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.

open-source SCALE is being released as a beta release, and is subject to change.
The processing codes use AMPX’s in-memory structures, which are in turn populated by “wrappers” that directly access the ENDF or GNDS formatted files.
• Several low-level access classes are used to access the GNDS files.
• Code has been updated to work with the GNDS-2.0 branch in the NEA GNDS gitlab
• The GNDS low-level access classes are available at https://code.ornl.gov/scale/code/external/gnds
  • The branch that supports GNDS-2.0 is available at: https://code.ornl.gov/scale/code/external/gnds/-/tree/GNDS-2.0
THERMAL SCATTERING LAW

• Improved angular gridding algorithm and more robust Short Collision Time subroutine under review for inclusion in future AMPX release
  • More accurate processing of moderators at cryogenic temperatures
• Implementation of the proposed mixed elastic scattering format underway.
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 → 10 eV thermal cutoff energy
  • New 258-group structure for HTGR
  • New 61-group structure, a subset of the 258-group structure
• Photoneutron production and photofission are major sources of neutron multiplication in accelerator-driven systems.

• AMPX modules have been updated to enable the processing of the ENDF photonuclear sublibrary for use in SCALE CE and MG transport.

• The SCALE CE photonuclear sublibrary is undergoing validation; the SCALE MG photonuclear sublibrary is under preparation.

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CONCLUSION

• AMPX can be built from the open source repo: https://code.ornl.gov/scale/code/scale-public
• AMPX support for the GNDS library continues. Public repo for GNDS compatibility layer:
  https://code.ornl.gov/scale/code/external/gnds
• AMPX development continues to support updated thermal scattering law libraries.
• The MG library group structures have been established for SCALE 7.0.0.
• The capability to process the photonuclear sublibrary has been introduced.

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