



Sensitivity Analysis of Neutron Resonance Parameters

Matthew Lazaric

University of New Mexico

Christopher Perfetti PhD, Mlazaric@unm.edu

Consortium for Monitoring, Technology, and Verification (MTV)



Introduction and Motivation

- Nuclear cross section data are vital to the accuracy of modeling and simulation tools.
- Our goal is to use integral benchmark experiment data to improve the fidelity of nuclear data evaluations.
- This goal will be accomplished by using data assimilation methods and the results of integral experiments to “calibrate” nuclear data evaluations.

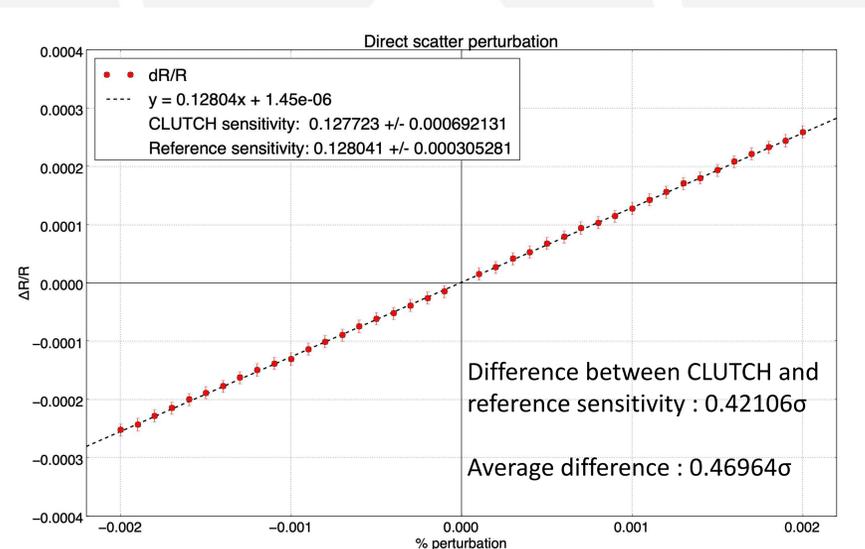
Mission Relevance

- Nuclear Data (particularly fission cross sections) are necessary for detection, characterization and tracking of nuclear materials and equipment.
- Errors and inconsistencies in nuclear data limit the predictive capability of our modeling and simulation tools.

Technical Approach

- Develop the capability to estimate the sensitivity of integral experiment results to evaluated nuclear data parameters.
- Use Bayesian Data assimilation methods and the results of integral experiments to calibrate these nuclear data parameters.
- Work will be performed in production level codes (Ideally TSUNAMI/TSURFER) and in collaboration with LANL and ORNL.

Results



Expected Impact

- If successful, This work will generate:
 - More accurate nuclear data evaluations with lower uncertainty estimates
 - The first methodology for consistently evaluating nuclear data using integral experiments
 - Potential for improving non-cross section nuclear data

MTV Impact

- The funding provided by MTV allows for:
 - traveling to professional events
 - Developing research opportunities and personnel pipelines between ORNL and LANL

Conclusion

- Development of this method will allow for more accurate fits of evaluated nuclear data with decreased uncertainty
- More accurate cross section data allows for better detection, tracking and characterization of special nuclear materials and equipment

Next Steps

- Implement and demonstrate the capability of the method
- Expand the method to the unresolved resonance and fast energy regions

