Richard L. Reed Jr.

OBJECTIVE

Support nonproliferation missions by modeling and simulation of nuclear systems.

RELEVANT EXPERIENCE

Nonproliferation Nuclear Engineer March 2022 - Present
Material Security and Counterproliferation Group, Oak Ridge National Laboratory, Oak Ridge, TN

- Developed novel protactinium monitoring method for molten salt reactors
- Investigated techniques for differentiating uranium isotopes using neutron NDA
- Evaluated criticality of long-term storage casks using parametric evaluations

Postdoctoral Research Associate March 2020 - March 2022
Material Security and Counterproliferation Group, Oak Ridge National Laboratory, Oak Ridge, TN

- Tracked isotopic inventories of nuclear reactors during operation
- Evaluated reactor designs for safeguards and proliferation vulnerabilities
- Assessed the protactinium content in thorium breeder reactors

Graduate Research Assistant Aug 2013 - Dec 2019
Mechanical and Nuclear Engineering, Kansas State University, Manhattan, KS

- Explored improvements to the Discrete Generalized Multigroup method by means of basis expansion and spatial homogenization.

Student Scientist June 2016 - Aug 2016
Computational Physics and Methods Group (CCS-2), LANL, Los Alamos, NM

- Implemented the Discrete Diffusion Monte Carlo method applied to an arbitrary triangular mesh in Python

EDUCATION

Doctorate of Philosophy, Nuclear Engineering Dec 2019
Kansas State University, Manhattan, KS

Graduate Certificate in Applied Mathematics, Nuclear Engineering Dec 2016
Kansas State University, Manhattan, KS

Master of Science, Nuclear Engineering May 2015
Kansas State University, Manhattan, KS

Bachelor of Science, Chemical Engineering May 2011
Kansas State University, Manhattan, KS
Secondary Major: Biological Engineering

COMPUTER SKILLS

Languages & Software: Python, Fortran90, C++, SCALE, MCNP6, Serpent2, Git

PROFESSIONAL AFFILIATIONS & ACTIVITIES

Member of American Nuclear Society (ANS)
Member of Alpha Nu Sigma, Nuclear Engineering Honorary
Member of Omega Chi Epsilon, Chemical Engineering Honorary
Awarded the Computational Physics Summer Workshop Fellowship 2015 at LANL
Awarded the Kansas State University Nuclear Research Fellowship

PUBLISHED WORKS

Full Publications

- R. L. Reed, E. C. Uribe, and L. G. Evans, "Real-time inventory change detection for the protactinium decay inventory of the molten salt breeder reactor," *Nuclear Technology*, pp. 1–10, 2022
- R. L. Reed, L. G. Evans, and D. N. Kovacic, "Safeguards for the lithium fluoride thorium reactor: A preliminary nuclear material control and accounting assessment," Tech. Rep. ORNL/TM-2022/2394, Oak Ridge National Laboratory, Oak Ridge, TN, USA, Aug 2022
- B. Brickner, R. Cumberland, R. Reed, and A. Lang, "Post-closure nuclear criticality safety evaluations for disposition of criticality control overpacks at the waste isolation pilot plant," Tech. Rep. ORNL/TM-2021/2046, Oak Ridge National Laboratory, Oak Ridge, TN, USA, Feb 2022
- R. L. Reed and J. A. Roberts, "Extension of the discrete generalized multigroup method using sph factors," *Annals of Nuclear Energy*, vol. 167, p. 108832, 2022
- L. G. Worrall, V. Henzl, A. Swift, N. P. Luciano, E. Cervi, J. Cooley, B. Davies, J. S. Denton, A. Favalli, B. Grogan, A. Krichinsky, K. Hogue, M. L. Lockhart, D. J. Mercer, A. Milojevich, J. Stinnett, R. Reed, and A. Worrall, "Safeguards technology for thorium fuel cycles: Research and development needs assessment and recommendations," Tech. Rep. ORNL/TM-2020/1866, Oak Ridge National Laboratory, Oak Ridge, TN, USA, May 2021
- R. Reed, *Improvements to the discrete generalized multigroup method based on proper orthogonal decomposition and SPH factors.* PhD thesis, Kansas State University, Dec 2019
- R. L. Reed and J. A. Roberts, "Effectiveness of the discrete generalized multigroup method based on truncated, pod-driven basis sets," *Annals of Nuclear Energy*, vol. 126, pp. 253–261, 2019
- R. L. Reed and J. A. Roberts, "Application of the karhunen–loève transform to the c5g7 benchmark in the response matrix method," *Annals of Nuclear Energy*, vol. 103, pp. 350–355, 2017
- R. L. Reed and J. A. Roberts, "An energy basis for response matrix methods based on the karhunen–loéve transform," *Annals of Nuclear Energy*, vol. 78, pp. 70–80, 2015
- R. L. Reed, "Applications of the karhunen-loéve transform for basis generation in the response matrix method," Master's thesis, Kansas State University, May 2015
- J. A. Roberts, R. L. Reed, and B. Forget, "Phase space bases for response matrix methods," in *PHYSOR 2014*, (Kyoto, Japan), American Nuclear Society, Mar 2014

Sponsor Controlled Reports

- "Approaches for monitoring protactinium isolation in thorium fuel cycles" - Sandia Report; Oct 2021
- "Safeguards implications of U-232 reduction in thorium fuel cycles" - Sandia Report; Oct 2021
- "Quantification of protactinium production rates in thorium fuel cycles" - Sandia Report; Oct 2020

Conference Proceedings

- E. C. Uribe, S. M. Gilbert, L. G. Worrall, N. P. Luciano, R. L. Reed, N. A. McGirl, and J. J. Powers, "Accountable nuclear material production from fissile isotope precursors in advanced fuel cycles: The case of protactinium-233," *Proceedings of the Institute of Nuclear Materials Management (INMM) 62nd Annual Meeting*, Aug 2021
- R. L. Reed and J. A. Roberts, "Enhancements to the discrete generalized multigroup method," *Transactions of the American Nuclear Society*, vol. 120, pp. 475–478, June 2019
- L. Xu, R. L. Reed, and J. A. Roberts, "Acceleration of the flattened power method with dynamic mode decomposition," *Transactions of the American Nuclear Society*, vol. 121, pp. 832–835, Nov 2019
- D. W. Gould and R. L. Reed, "Conceptual design of a homogeneous foam core fast reactor," in *Nuclear and Emerging Technologies for Space 2018*, (Las Vegas, NM), American Nuclear Society, Feb 2018
- Y. H. Park, A. Swenson, P. P. H. Wilson, Y. Cheng, R. L. Reed, and J. A. Roberts, "Improved modeling of the university of wisconsin nuclear reactor by automatic generation of computational models," in *PHYSOR 2018*, (Cancún, Mexico), American Nuclear Society, April 2018
- R. L. Reed and J. A. Roberts, "Application of truncated karhunen-loève transform basis sets in the 1-d discrete generalized multigroup method," *Transactions of the American Nuclear Society*, vol. 117, pp. 714–717, Oct 2017
- J. C. Boyington, R. L. Reed, R. M. Ullrich, and J. A. Roberts, "Gamma-ray and thermal-neutron filter design for a triga penetrating beam port," *Transactions of the American Nuclear Society*, pp. 1162–1165, Oct 2017
- R. L. Reed and J. A. Roberts, "Application of the karhunen-loéve transform to the c5g7 benchmark in the response matrix method," *Transactions of the American Nuclear Society*, vol. 113, pp. 1278–1281, Oct 2015
- R. L. Reed, F. G. VanGessel, M. Cleveland, A. Wollaber, and T. Urbatsch, "Monte carlo thermal radiation transport: Discrete diffusion monte carlo (ddmc) on triangular mesh," *2015 Los Alamos National Laboratory Computational Physics Student Summer Workshop*, pp. 14–28, Aug 2015
- R. L. Reed and J. A. Roberts, "Energy expansion in response matrix methods using the karhunen-loéve transform," *Transactions of the American Nuclear Society*, vol. 110, pp. 239–242, June 2014

Poster Presentations

- R. L. Reed and J. A. Roberts, "Enhancements to the discrete generalized multigroup method," in *Symposium on advanced sensors and modeling techniques for nuclear reactor safety*, (Mumbai, India), Dec 2018. Poster Presentation
- R. L. Reed and J. A. Roberts, "Accuracy of the discrete generalized multigroup method using truncated basis sets," *Transactions of the American Nuclear Society*, November 2016. Poster Presentation
- R. L. Reed, J. W. Hayhurst, S. D. Gangadhara, and J. A. Roberts, "Updating a pwr simulator in python," *Transactions of the American Nuclear Society*, vol. 114, pp. 952–954, June 2016. Poster Presentation