Kevin J. Connolly
Oak Ridge National Laboratory
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Summary

Versatile early-career Ph.D. with expertise in nuclear and transportation systems analysis stemming from collaborative research in developing numerical methods for modeling and simulation of nuclear reactor physics and radiation transport, and in the analysis of alternative options for the transportation of commercial used nuclear fuel. Skill in writing, reviewing, and presenting research proposals, technical results, journal articles, and sponsored reports. Research and development experience in radiation transport theory, packaging and transportation of used nuclear fuel and other radioactive material, and reactor neutronics.

Education

Ph.D. *Nuclear and Radiological Engineering*   GPA: 4.00/4.00
Georgia Institute of Technology, December 2012

Dissertation: A Coarse Mesh Radiation Transport Method for Reactor Analysis in Three Dimensional Hexagonal Geometry

M.S. *Nuclear Engineering*   GPA: 4.00/4.00
Georgia Institute of Technology, August 2011

Thesis: A Coarse Mesh Radiation Transport Method for Prismatic Block Thermal Reactors in Two Dimensions

B.S. *Nuclear and Radiological Engineering*   GPA: 3.93/4.00
Georgia Institute of Technology, December 2008

Experience

6/2016-present *Research and Development Staff Associate*
Oak Ridge National Laboratory   Oak Ridge, Tenn.
Used Fuel Systems Group
Supervisor: John Scaglione
Supporting radioactive material packaging and transportation research and development activities
- o Contributing to multi-laboratory team focused on development of the transportation system for future shipments of used nuclear fuel and high-level radioactive waste from commercial nuclear power plant sites to an interim storage facility or repository, in support of DOE-NE's Nuclear Fuels Storage and Transportation Planning Project (NFST)
- o Leading and contributing to development of transportation system operations and hardware deliverables for sponsor
- o Collecting historical data related to the transportation of used nuclear fuel and high-level radioactive waste worldwide
- o Assisting in radioactive material package testing at the National Transportation Research Center's Package Evaluation Facility

6/2014-5/2016 *Postdoctoral Research Associate*
Oak Ridge National Laboratory   Oak Ridge, Tenn.
Used Fuel Systems Group
Mentor: Matt Feldman
Supervisor: John Scaglione, 11/2014-present; John Wagner, 6/2014-10/2014

Supported radioactive material packaging and transportation research and development activities

- o Developed methods for estimating radiation dose to the public resulting from radioactive material transportation in support of NFST
- o Contributed to NFST transportation system project planning efforts
- o Assisted in preparing Accredited Standards Committee N14 (Packaging and Transport of Radioactive and Non-Nuclear Hazardous Material) for an audit by the American National Standards Institute
- o Performed oversight review of the Model 9980 safety analysis report for packaging (SARP) content modification

1/2013-5/2014 *Postdoctoral Fellow*
Georgia Institute of Technology Atlanta, Georgia
Research: Computational Reactor and Medical Physics Laboratory
Supervisor: Farzad Rahnema

- o Arranged winning $5M multi-year multi-university proposal for the 2014 NEUP Integrated Research Project "Integrated Approach to Fluoride High Temperature Reactor (FHR) Technology and Licensing Challenges"
- o Active in the ongoing development of the COMET whole reactor core neutron transport method, including coupling the neutronics method to a thermal fluids solver and continuing in benchmark problem development and method validation
- o Trained new graduate students in the use of laboratory tools including COMET for whole reactor core analysis and MoCS-Gen for generation of multigroup cross sections

Teaching: Nuclear and Radiological Engineering
Instructor, Spring 2014 – NRE 3208: Nuclear Reactor Physics I
Instructor, Fall 2013 - NRE 4328: Radiation Sources and Applications

1/2009-12/2012 *Graduate Research Fellow*
Georgia Institute of Technology Atlanta, Georgia
Computational Reactor and Medical Physics Laboratory
Advisor: Farzad Rahnema
Lead student developer of the COMET method

- o Implemented method in hexagonal geometry
- o Verified method using core benchmark problems from literature
- o Created new heterogeneous core benchmark problems for more rigorous testing

Proficient in Fortran90, MCNP5, and TecPlot

8/2010-12/2010 *Teaching Assistant*
Georgia Institute of Technology Atlanta, Georgia
NRE 6101 – Fundamentals of Neutral Particle Transport
In conjunction, took *ME/NRE 7757, Teaching Practicum*, a course designed for prospective future professors

1/2008-12/2008 *Undergraduate Research Assistant*
Georgia Institute of Technology Atlanta, Georgia

5/2007-8/2007; *Teller*
5/2008-8/2008 **Framingham Co-operative Bank** Framingham, Mass.

9/2005-12/2005 *Curriculum Consultant*
Achievement First New Haven, Conn.

Awards

- Best Presentation *(out of 45 given)*, 3rd Annual ORNL Postdoc Research Symposium, 2015
- Dean Griffin Day Thank-a-Teacher recipient, 2014
- U.S. Department of Energy Nuclear Energy University Programs Fellow, 2009-2012
- Georgia Institute of Technology President's Fellow, 2009-2012
- U.S. Nuclear Regulatory Commission Fellow, 2009
- First in Class, George W. Woodruff School of Mechanical Engineering, 2008
    - *out of 145 graduates majoring in mechanical engineering and nuclear and radiological engineering*
- Georgia Tech President's Undergraduate Research Award, 2008
- George W. Woodruff Scholar, 2005-2008
- American Nuclear Society Incoming Freshman Scholarship, 2005

Students Mentored

Christopher Kuprianczyk, University of Illinois, summer 2015

Professional Affiliations

American Nuclear Society member, 2005-present
Georgia Tech NRE Student Advisory Committee member, 2006-2012
ANS Georgia Tech Student Section member, 2005-2012
National Eagle Scout Association member, 2003-present

Publications

Archival journal papers:

7.   K. J. Connolly, "Unit Dose Factors for Calculating Collective Dose over Transportation Routes," *Packaging, Transport, Storage & Security of Radioactive Material*, (2016) (in preparation).

6.   K. J. Connolly, A. J. Huning, F. Rahnema, and S. Garimella, "A Coarse Mesh Coupled Neutronics and Thermal Fluids Method for Prismatic Cores," *Nuclear Science and Engineering*, (2016) (accepted).

5.   R. M. Ulmer, F. Rahnema, and K. J. Connolly, "A Neutronic Benchmark Specification and COMET Solution for the Advanced Burner Test Reactor," *Annals of Nuclear Energy*, **87**(1), pp. 76-106 (2016).

4.   J. M. Pounders, F. Rahnema, and K. J. Connolly, "The History-Partitioning Method for Multigroup Stochastic Cross Section Generation," *Nuclear Engineering and Design*, **293**, pp. 16-22 (2015).

3.   K. J. Connolly, F. Rahnema, and P. V. Tsvetkov, "Prismatic VHTR Neutronic Benchmark Problems," *Nuclear Engineering and Design*, **285**, pp. 207-240 (2015).

2.   K. J. Connolly and F. Rahnema, "A Heterogeneous Coarse Mesh Radiation Transport Method for Neutronic Analysis of Prismatic Reactors," *Annals of Nuclear Energy*, **56**, pp. 87-101 (2013).

1.   K. J. Connolly, F. Rahnema, and D. Zhang, "A Coarse Mesh Radiation Transport Method for 2-D Hexagonal Geometry," *Annals of Nuclear Energy*, **42**, pp. 1-10 (2012).

Full conference papers:

13.   K. J. Connolly and R. B. Pope, "Cataloguing Past Incidents in Spent Nuclear Fuel Transportation," *ASME 2016 Pressure Vessels and Piping Conference*, Vancouver, BC, Canada, July 17-21, 2016, ASME (2016) (accepted).

12.   G. Radulescu and K. J. Connolly, "A Parametric Analysis on Factors Affecting Calculations of Estimated Dose Rates from Spent Nuclear Fuel Shipments," *WM Symposia Conference (WM2016)*, Phoenix, AZ, USA, March 6-10, 2016, WM Symposia, Inc. (2016).

11.   K. J. Connolly and E. Kalinina, "Unit Dose Factors for Transportation of Radioactive Materials," *ASME 2015 Pressure Vessels and Piping Conference*, Boston, MA, USA, July 19-23, 2015, ASME (2015).

10.   M. Feldman and K. Connolly, "Laying the Groundwork for a Large-Scale Spent Nuclear Fuel Transportation System," *ASME 2015 Pressure Vessels and Piping Conference*, Boston, MA, USA, July 19-23, 2015, ASME (2015).

9.   M. Feldman, J. Wagner, K. Connolly, S. Maheras, E. Bickford, J. Jones, and P. Schwab, "Laying the Groundwork for a Large-Scale Spent Nuclear Fuel Transportation System," *2015 International High-Level Radioactive Waste Management Conference*, Charleston, SC, USA, April 12-16, 2015, American Nuclear Society (2015).

8.   M. Feldman, J. Wagner, K. Connolly, S. Maheras, E. Bickford, J. Jones, and P. Schwab, "Laying the Groundwork for a Large-Scale Spent Nuclear Fuel Transportation System," *WM Symposia Conference (WM2015)*, Phoenix, AZ, USA, March 15-19, 2015, WM Symposia, Inc. (2015).

7.   K. J. Connolly and F. Rahnema, "Generating Multigroup Data Stochastically for a Highly Heterogeneous VHTR Problem," *PHYSOR 2014 – The Role of Reactor Physics Toward a Sustainable Future*, Kyoto, Japan, September 28-October 3, 2014, American Nuclear Society (2014).

6.   F. Rahnema, D. Zhang, and K. J. Connolly, "The COMET Method for Reactor Physics Calculations," *The 19th Pacific Basin Nuclear Conference (PBNC 2014)*, Vancouver, BC, Canada, August 24-28, 2014, Canadian Nuclear Society (2014).

5.   K. J. Connolly and F. Rahnema, "Solving the Heterogeneous VHTR Core with Efficient Grid Computing," *Joint International Conference on Supercomputing in Nuclear Applications and Monte Carlo 2013 (SNA + MC 2013)*, La Cité des Sciences et de l'Industrie, Paris, France, October 27-31, 2013, Société Française d'Energie Nucléaire (2013).

4.   K. J. Connolly, A. J. Huning, F. Rahnema, and S. Garimella, "Coupled Neutron Transport and Thermal Fluids Calculations for the VHTR," *Joint International Conference on Supercomputing in Nuclear Applications and Monte Carlo 2013 (SNA + MC 2013)*, La Cité des Sciences et de l'Industrie, Paris, France, October 27-31, 2013, Société Française d'Energie Nucléaire (2013).

3.   K. J. Connolly and F. Rahnema, "A Demonstration of a Whole Core Neutron Transport Method in a Gas Cooled Reactor," *International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering (M&C 2013)*, Sun Valley, Idaho, USA, May 5-9, 2013, American Nuclear Society (2013).

2.　　K. J. Connolly and F. Rahnema, "The COMET Method in 3-D Hexagonal Geometry," *PHYSOR 2012: Advances in Reactor Physics*, Knoxville, TN, USA, April 15-20, 2012, American Nuclear Society (2012).

1.　　K. J. Connolly, F. Rahnema, and D. Zhang, "Extension of the COMET Method to 2-D Hexagonal Geometry," *International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering (M&C 2011)*, Rio de Janiero, RJ, Brazil, May 8-12, 2011, Latin American Section / American Nuclear Society (2011).

Conference Summaries and Abstracts:

10.　　K. J. Connolly and R. B. Pope, "Cataloguing Past Incidents in Transporting Spent Nuclear Fuel," *Transactions of the American Nuclear Society*, **114** (2016) (accepted).

9.　　M. Feldman, K. Connolly, E. Bickford, and P. Schwab, "Laying the Groundwork for a Large-Scale Used Fuel Transportation System," *PATRAM 2016: The 18th International Symposium on the Packaging and Transportation of Radioactive Materials*, Kobe, Japan, September 18-23, 2016, Japan Society of Mechanical Engineers and Atomic Energy Society of Japan (2016) (accepted).

8.　　K. J. Connolly and J. Holm, "US DOE Progress on Implementing US National Academies of Sciences Recommendations for Spent Nuclear Fuel Transportation," *PATRAM 2016: The 18th International Symposium on the Packaging and Transportation of Radioactive Materials*, Kobe, Japan, September 18-23, 2016, Japan Society of Mechanical Engineers and Atomic Energy Society of Japan (2016) (accepted).

7.　　K. J. Connolly and G. Radulescu, "Evaluation of Simplified Models for Estimating Public Dose from Spent Nuclear Fuel Shipments," *Transactions of the American Nuclear Society*, **113**, pp. 265-8, (2015).

6.　　K. J. Connolly, "Unit Dose Factors for Determining Public Radiation Dose from Spent Nuclear Fuel Transportation," *3rd Annual ORNL Postdoc Research Symposium*, Oak Ridge, TN, USA, July 30, 2015, Oak Ridge Postdoctoral Association (2015).

5.　　A. J. Huning, K. J. Connolly, S. Garimella, and F. Rahnema, "Finding a Near-Critical VHTR Configuration with a Coupled Neutronics/Thermal Hydraulics Method," *Transactions of the American Nuclear Society*, **110**, pp. 595-98 (2014).

4.　　K. J. Connolly and F. Rahnema, "Response Expansion of Incident Angular Flux and Current for Transport Calculations," *Transactions of the American Nuclear Society*, **107**, pp. 1151-3 (2012).

3.　　K. J. Connolly and F. Rahnema, "Calculation of Incremental Control Rod Reactivity Worth using COMET," *Transactions of the American Nuclear Society*, **106**, pp. 747-49 (2012).

2.　　K. J. Connolly, F. Rahnema, and D. Zhang, "COMET-Hex Solution to a 2-D Stylized High Temperature Test Reactor Benchmark," *Transactions of the American Nuclear Society*, **104**, pp. 71-2 (2011).

1.　　K. J. Connolly, "Use of Block-Level Symmetry in COMET-Hex Response Function Generator," *ANS Student Conference 2011*, Atlanta, GA, USA, April 14-17, 2011.

Technical Reports:

11.	K. J. Connolly, W. J. Reich, M. R. Feldman, A. S. Dam, C. Gruber, E. A. Kalinina, R. E. Best, and S. J. Maheras, *Analysis Methodologies and Data Needs for Hardware Acquisition Strategy Development*, ORNL/SR-2016/213 (FCRD-NFST-2016-000670), Oak Ridge National Laboratory, Oak Ridge, Tenn., May 27, 2016.

10.	K. J. Connolly, M. R. Feldman, W. J. Reich, S. J. Maheras, and R. E. Best, *Transportation System Concept of Operations: High Level Pictorial Depiction*, ORNL/SR-2016/107 (FCRD-NFST-2016-000472), Oak Ridge National Laboratory, Oak Ridge, Tenn., March 25, 2016.

9.	K. J. Connolly, B. Reich, and R. M. Cumberland, *Railcar and Transportation Cask Maintenance and Operations Activities*, ORNL/SR-2015/747 (FCRD-NFST-2016-000666), Oak Ridge National Laboratory, Oak Ridge, Tenn., January 29, 2016.

8.	S. J. Maheras, E. Helvey, C. Messick, J. Holm, and K. J. Connolly, *Role of Transportation in Consent-Based Siting*, PNNL-25057 (FCRD-NFST-2016-000665), Pacific Northwest National Laboratory, Richland, Wash., December 11, 2015.

7.	K. J. Connolly, S. Dam, S. Maheras, and E. Kalinina, *Initial Shutdown Sites Transportation Hardware Needs Analysis and Methods for Procurement Alternatives Evaluation*, ORNL/TM-2015/372 (FCRD-NFST-2015-000447), Oak Ridge National Laboratory, Oak Ridge, Tenn., September 11, 2015.

6.	M. Feldman, K. J. Connolly, and B. Reich, *Nuclear Fuels Storage and Transportation: Initial Five-Year Transportation System Project Plan*, ORNL/SPR-2015/394 (FCRD-NFST-2015-000443), Oak Ridge National Laboratory, Oak Ridge, Tenn., August 21, 2015.

5.	K. J. Connolly, P. A. Scofield, and R. B. Pope, *Past Incidents in Transporting Spent Nuclear Fuel and High Level Radioactive Waste*, ORNL/SPR-2015/275 (FCRD-NFST-2015-000663), Oak Ridge National Laboratory, Oak Ridge, Tenn., June 30, 2015.

4.	K. J. Connolly, *Transportation Route Dose Analysis using Unit Dose Factors and START*, ORNL/SPR-2015/154 (FCRD-NFST-2015-000445), Oak Ridge National Laboratory, Oak Ridge, Tenn., April 17, 2015.

3.	K. J. Connolly, *Unit Dose Factors for Incident-Free Spent Nuclear Fuel Transportation*, ORNL/TM-2015/27 (FCRD-NFST-2015-000662), Oak Ridge National Laboratory, Oak Ridge, Tenn., January 30, 2015.

2.	K. J. Connolly and J. Holm, *Implementing US National Academies Recommendations for SNF Transportation*, ORNL/TM-2014/694 (FCRD-NFST-2015-000664), Oak Ridge National Laboratory, Oak Ridge, Tenn., December 19, 2014.

1.	R. L. Howard, R. E. Hale, R. A. Joseph III, P. T. Singley, D. R. Giuliano, M. R. Feldman, K. J. Connolly, C. A. Kuprianczyk, G. M. Petersen, and R. B. Wilkerson, *ORNL Input on Design Concept Trade Studies Report: Cask Maintenance Facility (CMF) Functions, Requirements, and Concepts*, ORNL/LTR-2014/246 (FCRD-NFST-2014-000543), Oak Ridge National Laboratory, Oak Ridge, Tenn., June 30, 2014.