Tara Pandya

Group Lead

Education

2012 **Ph.D. Nuclear Engineering**, *Texas A&M University*, College Station, TX, GPA 4.0.
Dissertation, *Long-Characteristics Methods with Piecewise Linear Sources in Space and Time for Transport on Unstructured Grids.*

2009 **M.S. Nuclear Engineering**, *Texas A&M University*, College Station, TX, GPA 4.0.
Thesis, *Long Characteristic Method in Space and Time for Transport Problems.*

2006 **B.S. Nuclear Engineering**, *Texas A&M University*, College Station, TX, GPA 3.8.

Research

Ph.D. Dissertation

Title *Long-Characteristics Methods with Piecewise Linear Sources in Space and Time for Transport on Unstructured Grids*

Advisor Dr. Marvin Adams

Analytical/Computational

Expert in various computational science methods, parallel algorithms, deterministic radiation transport methods, Monte Carlo methods, and hybrid radiation transport methods.

Experience using various multiphysics and radiation transport codes: SCALE, MCNP, MPACT, Serpent

Co-developer of the following codes:

- Exnihilo: a massively parallel radiation transport library that contains Denovo deterministic transport (S_N, SP_N) and Shift Monte Carlo transport packages; *team developer.*
- VERA: CASL's Virtual Environment for Reactor Analysis (C++), https://www.casl.gov/vera; *Lead for Shift development and support for ex-core calculations.*
- SCALE: software packages for nuclear licensing and safety analysis (C++), ORNL/TM-2005/39; *team developer.*

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www.ornl.gov/staff-profile/tara-m-pandya • *tarapandya* • *Tara Pandya*

Professional Experience

2020–present **Group Lead**, *Oak Ridge National Laboratory*, Oak Ridge, TN.
Lead the Radiation Transport Group of 10 research and technical professionals. Collaborate with members in the Nuclear Energy and Fuel Cycle division and across ORNL. Leadership roles:
- *LDRD Focus Area Lead*: Transformational Nuclear Science and Technology Focus Area, 2020–2021

2017–2020 **R&D Staff**, *Oak Ridge National Laboratory*, Oak Ridge, TN.
Develop new computational methods, analysis methods, algorithms, and parallel radiaton transport application codes for use by ORNL, DOE, industry, and other sponsors. Collaborate with members in the HPC Methods and Applications Team and across ORNL. Mentor junior staff, PhD candidates, and students. Leadership roles:
- *LDRD Focus Area Lead*: Transformational Nuclear Science and Technology Focus Area, 2019–2020
- *Deputy*: Radiation Transport Methods Focus Area, CASL Energy Innovation Hub, 2017–2020

2014–2017 **Associate R&D Staff**, *Oak Ridge National Laboratory*, Oak Ridge, TN.
Develop new computational methods and apply them in parallel radiation transport application codes.

Internships and Research

2012–2014 **Postdoctoral Research Associate**, *Oak Ridge Institute for Science and Education*, Oak Ridge, TN.
Develop and implement methods in the Shift Monte Carlo radiation transport code.

2008-2012 **Graduate Research Assistant**, *Texas A&M University*, College Station, TX.
Perform research related to long-characteristc radiation transport methods in space and time.

2010 **Research Practicum**, *Lawrence Livermore National Laboratory*, Livermore, CA.
Develop and analyze optimal deterministic sweep algorithm for long characteristic method.

summer 2008 **Technical Intern**, *Sandia National Laboratories*, Albuquerque, NM.
Develop a parallel prefix algorithm for long characteristic method on unstructured grids.

summer 2006 **Technical Intern**, *Sandia National Laboratories*, Albuquerque, NM.
Perform design and analysis of Z-pinch driven nuclear system, ZEDNA, with MCNPX.

summer 2005 **Technical Intern**, *Sandia National Laboratories*, Albuquerque, NM.
Perform design and analysis of lunar nuclear reactor system using MCNP.

summer 2004 **Technical Intern**, *Sandia National Laboratories*, Albuquerque, NM.
Investigate heat pipe production companies for feasability of desalination with nuclear reactors.

Certifications

DOE Q-Clearance.

PhD Students

2017 **Madicken Munk**, *University of California*, Berkeley, CA.
FW/CADIS-Ω: An Angle-Informed Hybrid Method for Neutron Transport.

Software Skills

Operating Systems — Advanced user and developer experience with Unix, Linux, and Darwin systems.

Programming Languages — Expert programming ability in C++(11,14,17) and C, Python, and user of Jupyter Notebook. Limited programming ability in FORTRAN. Advanced user of bash and LaTeX.

Parallel Computing	Experienced developer on large, massively parallel architectures including XK7 (Titan). Knowledge of parallel programming systems and libraries including MPI and OpenMP.
Tools and Applications	Experienced with using and developing with the following tools: CMake, Git, MatLab, VisIt, HDF5, Trilinos, MS Office

Professional Courses Taken

2020 **Management Bootcamp**, *ORNL EOD*, Oak Ridge, TN.

2019 **Courageous Leaders Summit**, *WMFDP*, Oak Ridge, TN.

2019 **Fostering a Team Culture**, *ORNL EOD*, Oak Ridge, TN.

2018 **Software Construction Boot Camp**, *Construx Software*, Oak Ridge, TN.

2018 **The 5 Choices to Extraordinary Productivity**, *ORNL EOD*, Oak Ridge, TN.

2016 **Decision Making and Delegation Workshop**, *ORNL EOD*, Oak Ridge, TN.

2015 **Project Management Fundamentals**, *ORNL EOD*, Oak Ridge, TN.

Organizations and Professional Service

2006–2020 **American Nuclear Society**, *LaGrange Park, IL.*
Mathematics and Computation Division: Executive Committee, 2015–2018; Secretary, 2018–2020

2015–2020 **Oak Ridge/Knoxville American Nuclear Society Local Section**, *Oak Ridge, TN.*
Executive Committee, 2018–2020; Past Chair, 2017; Chair, 2016; Vice-Chair, 2015

2015 **Nuclear Science Week National Big Event**, *Knoxville, TN.*
Co-Chair

2014 **Oak Ridge Postdoctoral Association**, *Oak Ridge, TN.*
Research Committee

Honors and Awards

2020 **DOE Oppenheimer Science and Energy Leadership Program Cohort 4 Member**.

2018 **Knoxville YWCA Tribute to Women Honoree**.

2017 **DOE-NE Leaders of Tomorrow in Nuclear Energy Forum Participant**.

2017 **CASL Squire Honoree**.

2016 **Knoxville Business Journal 40 Under Forty Recipient**.

2016 **R&D 100, *Virtual Environment for Reactor Applications (VERA)***.

2014 **ORNL Award's Night *Research Accomplishment***.

2014 **International Data Corporation (IDC) HPC Innovation Excellence Award**.

2006–2008 **INPO Graduate Fellowship**.

2008–2012 **Alpha Nu Σ Honor Society**.

Patents and Copyrights

2019 **Exnihilo**, *Commercial Copyright*, Author, U.S. copyright 90000072.

2019 **VERA Infrastructure**, *Commercial Copyright*, Author, U.S. copyright 90000069.

2018 **CTF**, *Commercial Copyright*, Author, U.S. copyright 90000045.

2019 **ORIGEN API**, *Commercial Copyright*, Author, U.S. copyright 90000065.

Publications

Refereed Journal Publications

1. Cole Gentry, Andrew Godfrey, Gary Wolfram, Eva Davidson, Tara Pandya, Katherine Royston, Germina Ilas, Scott Palmtag, Gregory Davidson, Seth Johnson, Shane Hart, Benjamin Collins, Tom Evans, and K.S. Kim. Secondary Source Core Reload Modeling with VERA. *Nuclear Science and Engineering*, Accepted, 2020.

2. Shane Stimpson, Tara Pandya, Katherine Royston, and Benjamin S Collins. Impact of Radial Reflector Fidelity on Neutronics and Vessel Fluence Simulations. *Nuclear Technology*, Accepted, 2020.

3. J. Austin Ellis, Thomas M. Evans, Steven P. Hamilton, C.T. Kelley, and Tara M. Pandya. Optimization of Processor Allocation for Domain Decomposed Monte Carlo Calculations. *Parallel Computing*, 87:77–86, September 2019.

4. Elliott D. Biondo, Gregory G. Davidson, Tara M. Pandya, Steven P. Hamilton, and Thomas M. Evans. Deterministically Estimated Fission Source Distributions for Monte Carlo k–eigenvalue Problems. *Annals of Nuclear Energy*, 119:7–22, September 2018.

5. Gregory G. Davidson, Tara M. Pandya, Seth R. Johnson, Thomas M. Evans, Aarno E. Isotalo, Cole A. Gentry, and William A. Wieselquist. Nuclide Depletion Capabilities in the Shift Monte Carlo Code. *Annals of Nuclear Energy*, 114:259–276, April 2018.

6. R. N. Slaybaugh, M. Ramirez-Zweiger, Tara Pandya, Steven Hamilton, and T. M. Evans. Eigenvalue Solvers for Modeling Nuclear Reactors on Leadership Class Machines. *Nuclear Science and Engineering*, 190(1):31–44, April 2018.

7. Steven P. Hamilton, Thomas M. Evans, Gregory G. Davidson, Seth R. Johnson, Tara M. Pandya, and Andrew T. Godfrey. Hot Zero Power Reactor Calculations Using the Insilico Code. *Journal of Computational Physics*, 314:700–711, June 2016.

8. Tara M. Pandya, Seth R. Johnson, Thomas M. Evans, Gregory G. Davidson, Steven P. Hamilton, and Andrew T. Godfrey. Implementation, Capabilities, and Benchmarking of Shift, a Massively Parallel Monte Carlo Radiation Transport Code. *Journal of Computational Physics*, 308:239–272, March 2016.

9. Aarno E. Isotalo, G. G. Davidson, T. M. Pandya, W. A. Wieselquist, and S. R. Johnson. Flux Renormalization in Constant Power Burnup Calculations. *Annals of Nuclear Energy*, 96:148–157, 2016.

10. Gregory Davidson, Thomas Evans, Joshua Jarrell, Steven Hamilton, Tara Pandya, and Rachel Slaybaugh. Massively Parallel, Three-Dimensional Transport Solutions for the k-Eigenvalue Problem. *Nuclear Science and Engineering*, 177(2):111–125, June 2014.

11. S.D. Pautz, M.L. Adams, and T.M. Pandya. Scalable Parallel Prefix Solvers for Discrete Ordinates Transport. *Nuclear Science and Engineering*, 169:1–17, 2009.

Refereed Conference Publications

1. Eva Davidson, Andrew Godfrey, Tara Pandya, Katherine Royston, and Herschel Smith. Validation of VERA Ex-Core Detector Response Calculations for Shearon Harris. In *CASL Symposium*, November 2020.

2. Eva Davidson, Andrew Godfrey, Gary Wolfram, Cole Gentry, Tara Pandya, and Katherine Royston. Benchmarking of Source Range Detector Responses During Watts Bar unit 1 Refueling. In *CASL Symposium*, November 2020.

3. Tara Pandya, Katherine Royston, and Thomas Evans. Utilizing Shift in VERA for Ex-Core Calculations. In *CASL Symposium*, November 2020.

4. Eva Davidson, Tara Pandya, Katherine E. Royston, Thomas Evans, Andrew Godfrey, Shane Henderson, Gary Wolfram, and Joel Risner. Effect of Fission Source Spectrum on Monte Carlo Calculation of Ex-Core Quantities. In *PHYSOR 2020*, ANS PHYSOR Topical Meeting, June 2020.

5. Shane Henderson, Tara Pandya, and Shane Stimpson. Adjoint Driven Ex-Core Response Estimation in PWR with Thermal Feedback. In *Transactions of the American Nuclear Society*, volume 122, pages 725–728, Virtual Conference, June 2020. American Nuclear Society.

6. Tara Pandya, Katherine Royston, Eva Davidson, Thomas Evans, Andrew Godfrey, Shane Henderson, Cole Gentry, Shane Stimpson, and Benjamin S Collins. High-Fidelity Ex-Core Capabilities in VERA. In *PHYSOR 2020*, ANS PHYSOR Topical Meeting, June 2020.

7. Cole Gentry, Andrew Godfrey, Eva Davidson, G. Ilas, Benjamin S Collins, Shane Hart, K. S. Kim, Tara M. Pandya, Katherine Royston, Gregory Davidson, Seth Johnson, Thomas Evans, Gary Wolfram, and Scott Palmtag. Source Range Detector Response Modeling Using VERA. Seattle, WA, September 2019. American Nuclear Society.

8. Shane Henderson, Tara Pandya, Shane Stimpson, and Benjamin S Collins. Coupled Deterministic and Monte Carlo Neutronics for Vessel Fluence Calculations. Portland, OR, August 2019. American Nuclear Society.

9. E Davidson, T Pandya, A Godfrey, and M Asgari. WATTS BAR I EX-CORE ANALYSES USING VERA. In *ANS RPSD 2018 - 20th Topical Meeting of the Radiation Protection & Shielding Division of ANS*, ANS RPSD Topical Meeting, page 7, LaGrange Park, IL, August 2018. American Nuclear Society.

10. Herschel Smith, Eva Davidson, Andrew Godfrey, and Tara Pandya. An Analysis of Various Solution Strategies and Perturbations on Inputs of the Reactor Shielding Problem. Santa Fe, NM, August 2018. American Nuclear Society.

11. Casey Stocking, Tara Pandya, and Maria Avramova. Validation of MPACT Cross Section Library with Shift using VERA-CS. In *PHYSOR 2018: Reactor Physics paving the way towards more efficient systems*, ANS PHYSOR Topical Meeting, page 12, LaGrange Park, IL, 2018. American Nuclear Society.

12. Cole Gentry, Andrew T. Godfrey, Tara Pandya, Gregory Davidson, and Fausto Franceschini. AP1000 Benchmarking of VERA Neutronics Toolset. In *International Conference on Mathematics and Computational Methods Applied to Nuclear Science & Engineering*, Jeju Korea, April 2017.

13. Tara M. Pandya, Thomas Evans, Steven P. Hamilton, and J. Austin Ellis. A Fully Synchronous Domain Decomposed Transport Algorithm with Splitting. Atlanta, GA, February 2017.

14. M. Ramirez-Zweiger, Rachel N. Slaybaugh, Thomas Evans, Steven P. Hamilton, and Tara M. Pandya. Radiation Transport Using Rayleigh Quotient Iteration with Multigrid in Energy Preconditioning. Copper Mountain, CO, March 2016.

15. G. G. Davidson, T. M. Pandya, A. Isotalo, S. R. Johnson, T. M. Evans, and W. A. Wieselquist. Nuclide Depletion Capabilities in the Shift Monte Carlo Code. In *PHYSOR 2016—Unifying Theory and Experiments in the 21st Century*, ANS PHYSOR Topical Meeting, LaGrange Park, IL, 2016. American Nuclear Society.

16. M. Munk, R. N. Slaybaugh, T. M. Pandya, S. R. Johnson, and T. M. Evans. FW/CADIS-Ω: An Angle-Informed Hybrid Method for Deep-Penetration Radiation Transport. In *PHYSOR 2016—Unifying Theory and Experiments in the 21st Century*, ANS PHYSOR Topical Meeting, LaGrange Park, IL, 2016. American Nuclear Society.

17. T. M. Evans, W. Joubert, S. P. Hamilton, S. R. Johnson, J. A. Turner, G. G. Davidson, and T. M. Pandya. Three-Dimensional Discrete Ordinates Reactor Assembly Calculations on GPUs. In *ANS MC2015—Joint International Conference on Mathematics and Computation (M&C), Supercomputing in Nuclear Applications (SNA) and the Monte Carlo (MC) Method*, ANS M&C Topical Meeting, LaGrange Park, IL, 2015. American Nuclear Society.

18. T. M. Pandya, S. R. Johnson, G. G. Davidson, T. M. Evans, and S. P. Hamilton. Shift: A Massively Parallel Monte Carlo Radiation Transport Package. In *ANS MC2015—Joint International Conference on Mathematics and Computation (M&C), Supercomputing in Nuclear Applications (SNA) and the Monte Carlo (MC) Method*, ANS M&C Topical Meeting, LaGrange Park, IL, 2015. American Nuclear Society.

19. T. M. Pandya, M. L. Adams, and W. D. Hawkins. Long Characteristics with Piecewise Linear Sources Designed for Unstructured Grid. In *ANS MC2011—Joint International Conference on Mathematics and Computation (M&C), Supercomputing in Nuclear Applications (SNA) and the Monte Carlo (MC) Method*, ANS M&C Topical Meeting, LaGrange Park, IL, May 2011. American Nuclear Society.

20. T. M. Pandya and M. L. Adams. Method of Long Characteristics Applied in Space and Time. In *ANS MC2009—International Conference on Advances in Mathematics, Computational Methods, and Reactor Physics*, ANS M&C Topical Meeting, LaGrange Park, IL, May 2009. American Nuclear Society.

21. S. D. Pautz, T. M. Pandya, and M. L. Adams. Scalable Parallel Prefix Solvers for Discrete Ordinates Transport. In *ANS MC2009—International Conference on Advances in Mathematics, Computational Methods, and Reactor Physics*, ANS M&C Topical Meeting, LaGrange Park, IL, May 2009. American Nuclear Society.