

# Jinan J. Yang – Résumé

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## Work:

Radiation Transport Group  
Reactor and Nuclear Systems Division  
Oak Ridge National Laboratory  
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## Contact Information:

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## Education

**Mar. 2011** Ph.D. in Nuclear Engineering and Radiological Sciences - University of Michigan

Thesis title: A Functional Monte Carlo (FMC) Method for k-Eigenvalue Problems  
Advisor: Professor Edward W. Larsen

**Dec. 2007** M.S. in Nuclear Engineering and Radiological Sciences, University of Michigan

**Jul. 1988** B.Sc. in Applied Mathematics, Xian JiaoTong University (China)

### Graduate courses taken at the University of Michigan:

Nuclear Reactor Theory I, Nuclear Reactor Theory II, Nuclear Reactor Kinetics, Radiation Shielding, Reactor Safety Analysis, Nuclear Core Design and Analysis I, Transport Theory, Transport Theory II, Nuclear Measurement Laboratory, Stochastic Processes, Monte Carlo Methods, Introduction to Plasmas, Intermediate Plasma Physics I, Complex Variables, Numerical Methods for Scientific Computing I, Numerical Methods for Scientific Computing II, and C++ Programming for Graduate Students.

GPA: 8.56 (A+ = 9.0, A = 8.0, A- = 7.0)

## Professional Experience

**Jan. 2016 - Present** Radiation Transport Group, Oak Ridge National Laboratory, Oak Ridge, TN 37831

**Present** *R&D Staff Member*

- The Consortium for Advanced Simulation of Light Water Reactors (CASL) milestone “Mechanism to Perturb Pin-By-Pin Enrichment and Mass”: Implemented fuel mass, fuel isotope and nonfuel isotope perturbations in VERA. *Key developer.*
- ORNL Laboratory Directed Research and Development (LDRD) Seed Money Fund “Development of a Whole Core Simulation Capability for Pebble Bed Reactors”. *Co-PI.*
- NRC “Coupling Fuel Performance with Neutronics” project: The project explores options to couple the fuel performance code FAST to SCALE for more accurate and automated fuel performance and lattice physics calculations for both LWR and non-LWR fuel. *Team developer.*
- NRC “Lattice Physics Enhancements and Assessment” project: The focus of the assessment is on the SCALE/Polaris lattice physics capabilities for advanced technology fuel (ATF) forms including various cladding designs. *Lead analyst.*
- NNSA “Fast Neutron Emission Tomography Design” project: Automated generation of MCNP models for detector collimators and detector wedges with PYTHON. Neutron and gamma shield design optimizations. Gamma dose rate calculations.
- US ITER projects: Integration of the ITER tokamak C-model with the building model for shutdown dose rate characterization. Integration of the neutral beam injector (NBI) system into the tokamak building model. Neutronics analyses for instrumentation and control electronics (I&C) shield design. using MCNP and ADVANTG software packages.
- NRC “Reactor Pressure Vessel Fluence Evaluation Methodology Guidance” project: Automated generation of MCNP models for both explicit and homogenized Watts Bar pressurized water reactor (PWR), and explicit Hatch 1 boiling water reactor (BWR) core.

**Dec. 2012** - Core Design Group, TerraPower, LLC, Bellevue, WA 98005

**Dec. 2015** *Core Neutronics Analyst*

- Developed Traveling Wave Reactor (TWR) core internal structures and ex-core MCNP models for neutronics analyses.
- Fluence and flux calculations outside the reactor vessel and guard vessel region of a TWR.
- DPA radiation damage and activation calculations for TWR internal components such as core support structures, core barrel, Intermediate Heat Exchanger (IHX), etc.
- Decay heat calculations for lead test assemblies (LTA) in a TWR.
- Uncertainty quantification of integral parameters of a TWR.
- Design analysis of passive reactivity devices for a commercial TWR (TWR-C).
- Design analysis of low power and source range monitoring systems for a TWR.
- Fuel sample heating calculations for supporting TWR fuel testing program at the Idaho National Laboratory (INL) Advanced Test Reactor (ATR).
- Cladding sample activation/DPA calculations for supporting TWR material testing at the BOR-60 fast reactor in Russia.

**May 2011** - NERS, University of Michigan, Ann Arbor, MI 48109

**Nov. 2012** *Postdoctoral Research Fellow*

Activities: Development and implementation of innovative hybrid deterministic and Monte Carlo methods that accelerate the convergence of large scale transport problems.

**Apr. 2000** - Nippon Advanced Information Service (NAIS) Co. Inc., Tokai, Japan

**Apr. 2004** *Research Staff Member*

- Shielding calculations for the LINAC baseline of the high-intensity proton accelerator (J-PARC) at Japan Atomic Energy Agency (JAEA).
- Shielding calculations for a BWR operated by Japan Atomic Power Company (Genden).
- Criticality and power distribution calculations for an existing PWR and a large scale PWR owned by Mitsubishi Nuclear Energy Systems.
- Shielding and activation calculations for the accelerator-driven transmutation reactor (ADS) proposed by JAEA.
- Criticality accident alarm system evaluations for various types of fuel material.
- Monte Carlo code MVP verification and validation: evaluated 500+ OECD criticality safety benchmark experiments.

**Sept. 1988** - Monte Carlo Method Group, China Institute of Atomic Energy (CIAE), Beijing, China

**Mar. 2000** *Research Staff Member*

- Monte Carlo radiation transport methods development. I focused on variance reduction techniques and computational speed up algorithms.
- Team developer of the reactor physics code XIMTC/PC.
- Team developer of the multi-group Monte Carlo code MCTGP-2D.
- While employed at CIAE, I spent a year at Japan Atomic Energy Agency via the STA National Scientist Exchange Program (see details below).

**Jan. 1998 - Dec. 1998:** Japan Atomic Energy Agency, O-Arai, Japan  
 Activities: Developed and implemented an algorithm to reduce the statistical variance in the Monte Carlo reliability evaluation code PHAMMON, which was used for large fast breeder reactor design studies.

## Teaching

**Sept. 1989 - Sept. 1994** - Graduate School of China National Nuclear Corporation (CNNC), Beijing, China

Adjunct assistant professor at the graduate school of CNNC.

## Summer Internships

**May 2005 - Jul. 2005** - University of Missouri - Columbia research reactor center (MURR), Columbia, MO 65211

Activities: Updated MCNP model for MURR core simulations. Neutronics calculations in preparation for the reactor lifetime extension.

**Jun. 2008 - Aug. 2008** - Oak Ridge National Laboratory, Oak Ridge, TN 37831

Activities: Implementation of tally statistical checks for the Monte Carlo code MONACO, which is a part of the SCALE code system.

## Honors

**2008** University of Michigan Rackham Graduate School Barbour Scholarship for Asian Women Award.

**2009** University of Michigan College of Engineering Distinguished Achievement Award.

**2010** University of Michigan Rackham Graduate School International Student Fellowship Award.

**2009** Member of the Phi Kappa Phi honor society.

**2009** Member of the Tau Beta Pi honor society.

## Publications

1. J. Yang, B. Collins, and S. Stimpson, *Fuel Performance Uncertainty Due to Manufacturing Tolerances*, Global/Top Fuel 2019, Washington, September 22-26, (2019). Accepted.
2. N. Luciano, L. Worrall, B. Grogan, J. Yang, and A. Worrall, *Safeguards Applications of Reactor Libraries to Thorium Fuel Cycles*, Global/Top Fuel 2019, Washington, September 22-26, (2019). Accepted.

3. W.J. Marshall, J.B. Clarity, J. Yang, U. Mertyurek, M.A. Jessee, and B.T. Rearden, *Initial Application of TSUNAMI for Validation of Advanced Fuel Systems*, International Conference on Nuclear Criticality Safety (ICNC 2019), France, Sep 15, (2019). Accepted.
4. W. J. Marshall, J. Yang, U. Mertyurek and M. A. Jessee, *Preliminary TSUNAMI Assessment of the Impact of Accident Tolerant Fuel Concepts on Reactor Physics Validation*, ANS Winter Meeting, Minnesota, June 9, (2019).
5. S. Wilson, S. Mosher, J. Yang, K. Royston, G. Radulescu, E. Davidson, R. Grove, *Large Scale Neutronics Modeling and Simulation for ITER*, IEEE Nuclear and Plasma Sciences Society, Florida, June 2, (2019).
6. J. Yang, S. Wilson, S. Mosher, and G. Radulescu, *Integration of the Full Tokamak Reference Model with the Complex Model for ITER Neutronic Analysis*, Fusion Science and Technology, Vol. 74, No. 4, p.277-287 (2018).
7. A. Iyengar, P. Hausladen, L. Fabris, J. Yang, and J. Hu, *Development of a nuclear fuel safeguards verification technology for new facility types: Use of fast neutron emission tomography for spent fuel verification*, Proceeding of IAEA Safeguards Symposium, Vienna, Austria, November 5-8, (2018).
8. F. Bostelmann, M. Jessee, K. Royston, J. Yang, and W. Wieselquist, *SCALE/FAST Fuel Performance Update*, 2018 SCALE Users' Group, Oak Ridge, August 27, (2018)
9. L. Worrall, A. Krichinsky, A. Swift, A. Favalli, A. Worrall, B. Grogan, B. Davies, C. Lloyd, E. Collins, J. Cooley, J. Yang, K. Hogue, N. Luciano, R. Lakis, S. Croft, and V. Henz, *Safeguards Challenges and Safeguards Technology Needs Assessment for Leading Thorium Fuel Cycles*, IAEA Symposium on International Safeguards, Vienna, Austria, November 5-8, (2018).
10. A. Iyengar, P. Hausladen, J. Yang, L. Fabris, J. Hu, A. Lousteau, J. Lacy, and A. Athanasiades, *Detection of Fuel Pin Diversion Using Fast Neutron Emission Tomography*, Proceedings of the ESARDA Non-Destructive Assay (NDA) Working Group, Luxembourg, May 17-18, (2018).
11. P. Hausladen, A. S. Iyengar, L. Fabris, J. Yang, J. Hu, J. Lacy, and M. A. Blackston, *Fast Neutron Emission Tomography of Used Nuclear Fuel Assemblies*, Proceedings of 2017 Fall Meeting of American Physics Society Division of Nuclear Physics, October 25-28, (2017).
12. J. Yang, S. Wilson, and S. Mosher, *MCNP Model Conversion and Integration*, XIIth ITER Neutronics Meeting, Cadarache, France, October 10-12, (2017).
13. K. Royston, J. Yang, E. Davidson, and S. Wilson, *ORNL Fusion Neutronics Analyses for Instrumentation and Control Electronics*, XIIth ITER Neutronics Meeting, Cadarache, France, October 10-12, (2017).
14. S. Wilson, J. Yang, and S. Mosher, *ORNL Shutdown Dose Rate Tools for ITER Fusion Neutronics*, XIIth ITER Neutronics Meeting, Cadarache, France, October 10-12, (2017).
15. R. Grove, S. Wilson, K. Royston, J. Yang, A. Ibrahim, S. Mosher, S. Johnson, J. Risner, *Summary of Recent Fusion Neutronics Analysis and Methods Development Work at Oak Ridge National Laboratory*, XIIth ITER Neutronics Meeting, Cadarache, France, October 10-12, (2017).
16. J. Yang, S. Wilson, and S. Mosher, *Integration of the ITER Tokamak C-model with the Building Model*, American Nuclear Society Transactions - Fusion Energy, Volume 116, Number 1, June, (2017).
17. A. Iyengar, P. Hausladen, J. Yang, L. Fabris, J. Hu, J. Lacy, and A. Athanasiades, *Detection of Fuel Pin Diversion via Fast Neutron Emission Tomography*, Proceedings of the 39th ESARDA Symposium, Dusseldorf, Germany, May 15-19, (2017).
18. N. W. Touran, and J. Yang, *Sensitivities and Uncertainties Due to Nuclear Data in a Traveling Wave Reactor*, Advances in Reactor Physics to Power the Nuclear Renaissance (PHYSOR), Sun Valley, Idaho, May 1-5, (2016).
19. J. Yang, *A Functional Monte Carlo Method for k-Eigenvalue Problems*, Ph.D. Thesis, University of Michigan, (2011).
20. J. Yang and E.W. Larsen, *Calculation of k-Eigenvalues and Multi-Group Eigenfunctions Using the Hybrid Functional Monte Carlo Method*, Advances in Reactor Physics to Power the Nuclear Renaissance (PHYSOR), Pittsburgh, Pennsylvania, May 9-14, (2010).

21. J. Yang and E.W. Larsen, *Application of the Functional Monte Carlo Method to Estimate Continuous Energy  $k$ -Eigenvalues and Eigenfunctions*, 2009 International Conference in Mathematics, Computational Methods and Reactor Physics, Saratoga Springs, New York, May 3-7, (2009).
22. E.W. Larsen and J. Yang, *A Functional Monte Carlo Method for  $k$ -Eigenvalue Problems*, Nuclear Science and Engineering, Vol. 159, p. 107 (2008).
23. E.W. Larsen and J. Yang, *New Functional Monte Carlo Method for Evaluating  $k$ -Eigenvalues and Eigenfunctions*, Transactions of the American Nuclear Society, Vol. 97, p. 469 (2007).
24. R. N. Blomquist, M. Armishaw, D. Hanlon, N. Smith, Y. Naito, J. Yang, Y. Mioshi, T. Yamamoto, O. Jacquet, and J. Miss, *Source Convergence in Criticality Safety Analyses, Phase I: Results for Four Test Problems*, NEA Report No. 5431, Nuclear Energy Agency, Organization for Economic Co-operation and Development, (2006).
25. T. Sasa, J. Yang, and H. Oigawa, *Shielding Analysis for the Upper Section of an Accelerator-Driven System*, Radiation Protection Dosimetry, Vol. 116, p. 256 (2005).
26. Y. Naito and J. Yang, *The Sandwich Method for Determining Source Convergence in Monte Carlo Calculations*, Journal of Nuclear Science and Technology, Vol. 41, No. 5, p. 559 (2004).
27. J. Yang, *The Status of Monte Carlo Simulation in Japan*, The Eighth Symposium on the Monte Carlo Method and its Applications, Kunming, China, Mar.28 - Apr. 2, (2004).
28. J. Yang and Y. Naito, *The Sandwich Method for Determining Source Convergence in Monte Carlo Calculations*, The Seventh International Conference on Nuclear Criticality Safety, Tokai, Japan, Oct. 20-24 (2003).
29. J. Yang, *An Overview of Research Activities Using the Monte Carlo Method and its Applications in China*, The Second Symposium on Monte Carlo Simulations: Status of Monte Carlo Methods in Particle Simulations, Atomic Energy Society of Japan Press, Tokyo, p. 9 (2002).
30. J. Yang and L. Pei, *The Extending of Monte Carlo Technique for MORSE Code -Transmitted Probability Calculations for a Spherical Geometry*, Chinese Journal of Computational Physics, Vol. 16, No. 1, p. 77 (1999).
31. J. Yang and L. Pei, *The Improvement of Monte Carlo Technique for MORSE Code -Transmitted Probability Calculations for a Slab Geometry*, The Monte Carlo Method and its Applications (1993-1997), Marine Press, Beijing, p.117 (1998).
32. J. Yang and T. Mihara, *Development of a Phased Mission Analysis Program with the Monte Carlo Method*, Japan Nuclear Cycle Development Institute (JNC) Technical Report: JNC TN9400 99-013, Japan (1998).
33. W. Li, J. Yang, and X. Zhang, *Two-Dimensional Geometry Thermal Group Monte Carlo Program (MCTGP-2D)*, Atomic Energy Science and Technology, Vol. 31, No. 3, p. 234 (1997)
34. J. Yang, and X. Zhang, *Conversion and Improvement of the Monte Carlo Code XIMTC/PC for a Personal Computer*, Computer Applications for Nuclear Engineering, Vol. 2, p. 34 (1997).

## ORNL Technical Report

1. J. Yang, B. Collins, and S. Stimpson, *Mechanism to Perturb Pin-By-Pin Enrichment and Mass*, Oak Ridge National Laboratory, CASL-U-2019-1811-000, March 06, 2019.
2. P. Hausladen, A. Iyengar, L. Fabris, J. Yang, J. Hu, *A Design Study of the Parallel-Slit Ring Collimator for Fast Neutron Emission Tomography of Spent Fuel*, Oak Ridge National Laboratory, ORNL/SPR-2018/975, October 2018.
3. M. A. Jessee, J. Yang, J. J. Powers, W. A. Wieselquist, *Assessment of SCALE Lattice Physics Models for ATF Evolutionary/Revolutionary Concepts*, ORNL/LTR-2018/7, Oak Ridge National Laboratory, February 2018.
4. S. C. Wilson, J. Yang, and S. W. Mosher, *Port 16 Pellet Injector System Model Construction and Preliminary Analysis*, ORNL/SPR-2017/567, Oak Ridge National Laboratory, February 2018.

5. G. Radulescu, K. Royston, J. Yang, and S. Wilson, *Preliminary Shutdown Dose Rate Assessment of Level L3 of the Tokamak Building for the US ITER Tokamak Cooling Water System*, ORNL/LTR-2017/519, Oak Ridge National Laboratory, November 2017.
6. E. Davidson, K. Royston, S. Wilson and J. Yang, *Analysis of Electronics Responses in Building B11 Due to Tokamak Plasma Source*, ORNL/SPR-2017/518, Oak Ridge National Laboratory, September 2017.
7. J. Risner, C. Daily, E. Davidson, and J. Yang, *Reactor Pressure Vessel Fluence Evaluation Methodology Guidance*, ORNL/SPR-2017/355, Oak Ridge National Laboratory, August 2017.
8. K. Royston, J. Yang, and S. Wilson, *Analysis of Electronics Responses in Building B11 Due to Activated Cooling Water*, ORNL/TM-2016/706, Oak Ridge National Laboratory, February 2017.