SHADI Z. GHRAYEB

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PROFESSIONAL EXPERIENCES

SECURITY CLEARANCE: ▮▮▮▮▮▮▮▮

U.S. Nuclear Regulatory Commission, Washington, DC, 09/2013 - present
Office of Nuclear Material Safety and Safeguards
Division of Spent Fuel Management, *Computational Reactor Physicist*
Nuclear Incident Response Team, *Technical Adviser*
- Develop new predictive models for existing reactor code systems with latest mathematical simulations to accurately represent neutron transport behavior
- Performed detailed confirmatory analyses of spent fuel and radioactive transportation and storage systems to verify they are adequately subcritical and comply with regulatory requirements
- Enhanced productivity by automating the extraction and manipulation of large data sets into a readable format for existing code systems using Python and Fortran
- Serve as project manager for NRC sponsored research and development projects, reviewed deliverables, provide technical reviews and issue direction
- Serve as a technical advisor issues related to NRC regulated licensees in the event of a site emergency. Actively participate in emergency drills in anticipation of potential nuclear related emergencies

U.S. Department of Energy, Idaho Falls, ID 11/2012 – 09/2013
Division of Advanced Reactors & Space Power
Office of Nuclear Energy, Idaho Operations Office
Nuclear Engineer
- Provided oversight of the nation's premier national nuclear energy laboratory by overseeing detailed technical activities such as formal design reviews, technical reviews, and prioritizations of R&D efforts and made recommendations
- Served as the point of contact and program manager for assigned technical topics, worth tens of millions of dollars, identified improvements, recommended new initiatives and issued direction

EDUCATION

The Pennsylvania State University
Doctor of Philosophy (PhD), Nuclear Engineering, August 2013
Thesis: "Deterministic Multigroup Modeling of Thermal Effect on Neutron Scattering by Heavy Nuclides"
U.S. Department of Energy NEUP Fellow
Summa Cum Laude

The Pennsylvania State University
Master of International Affairs (MIA), May 2012
Summa Cum Laude

The Pennsylvania State University
Masters of Science (M.S.), Nuclear Engineering, December 2008
U.S. Department of Energy AFCI/GNEP Fellow
Summa Cum Laude

Rensselaer Polytechnic Institute, Troy, NY
Bachelor of Science (B.S.), Nuclear Engineering and Engineering Physics, May 2007
Summa Cum Laude

The Data Incubator
Fellow, May 2015
Highly selective bootcamp program preparing PhDs for data science
Performed projects involving logistic regression, MapReduce, Spark,
Amazon Web Services, web scraping and machine learning

U.S. House of Representatives, Washington, D.C. 09/2012 – 11/2012
Honorable Congressman Dennis Kucinich
Congressional Staff
- Prepared reports, reviewed technical documents and wrote memos related to the relicensing of a nuclear reactor within the vicinity of the congressman's district
- Served as an intermediate between the congressional office and government agencies
- Attended congressional hearings, contributed to press releases, coordinated with experts regarding constituents' issues and conducted research of matters of interest to the congressman
- Conducted constituent surveys and remained engaged with their concerns

Lawrence Livermore National Laboratory, Livermore, CA summers 2006, 2007 & 2012
Technical Scholar
- Derived a method to estimate relative contribution to fission from select isotopes. Simulated depletion and decay calculations, collected large data sets and derived correlations (Global Security Directorate, Counter Proliferation Division)
- Developed algorithms using Monte Carlo methods to simulate collision processes of neutrons (Weapons and Complex Integration Directorate, AX Division – High Energy Density Physics Group)
- Performed radiation surveys, analyses and aggregated radioisotope isotope information for implementation into an algorithm to identify nuisance radiation sources for radiation portal monitors implemented at national border sites (Physics and Advanced Technologies Directorate, I Division)

Idaho National Laboratory, Idaho Falls, ID summers 2009, 2010 & 7/2011 – 5/2012
Reactor Physics Design and Analysis Team
Technical Scholar
- Derived a thermal nuclear upscattering model that more accurately describes neutron transport and implemented it into a lattice physics production code
- Provided verification and validation of the new mathematical model, and its implementation, against benchmark calculations

International Atomic Energy Agency (IAEA), Vienna, Austria 5/2011 – 6/2011
Nuclear Power Technology Development Section, Department of Nuclear Energy
- Coordinated the IAEA Coordinated Research Program on the High Temperature Gas Reactor Uncertainty Analysis in Modeling benchmark calculation. Analyzed benchmark specifications, physical properties, calculational tasks and required results.
- Implemented advanced reactor design concepts into IAEA inspectors training

Brookhaven National Laboratory, Upton, NY 12/2006 – 1/2007
Nuclear Science and Technology Division
Visiting Scholar
- Conducted research with the RELAP5/3D analysis team to analyze and simulate transient and postulated accidents and thermal hydraulics of nuclear reactors.

The Pennsylvania State University, University Park, PA 09/2007 – 05/2009
Department of Mechanical and Nuclear Engineering
Graduate Teaching Assistant
- Evaluated and counseled students of course content, reinforced lecture material, answered questions and maintained complete records for advanced undergraduate and graduate nuclear engineering courses, "Monte Carlo Methods", "Experimental Reactor Physics", "Advanced Reactor Design" and "Nuclear Reactor Core Design Synthesis"

- Python, Bokeh, R, Fortran, SQL, MATLAB, Hadoop, MapReduce,Spark, LaTex, LabVIEW, CAD, Minitab, PC/LINUX/MAC systems
- Monte Carlo Transport Codes: MCNP5, MCNPX, MONTEBURNS

ACADEMIC RECOGNITIONS AND HONORS

- U.S. Department of Energy Nuclear Engineering University Program Fellowship ($150,000)
- U.S. Department of Energy Advanced Fuel Cycle Initiative/Global Nuclear Energy Partnership ($42,500)
- 2011 U.S. Department of Energy Innovations in Fuel Cycle Research Award in System Analysis and Energy Policy, 1st place ($3,000)
- 2010 U.S. Department of Energy Innovations in Fuel Cycle Research Award in Nuclear Fuels, 1st place ($3,000)
- Center for Advanced Energy Studies Scholarship ($1,000)
- Rensselaer Medallion ($60,000)
- CVS Corporate Scholarship ($12,500)
- Bergen County 200 Club Scholarship ($10,000)
- National Academy for Nuclear Training Scholarship ($2500,yr)
- American Nuclear Society John Landis Scholarship ($4,000)
- Life Saving merit Award, American Red Cross
- CPR Unit Citation Award, Fort Lee, NJ Volunteer Ambulance Corps
- U.S. Presidential Volunteer Service Award

SELECT PUBLICATIONS

1. **S. Z. Ghrayeb**, V. Wilson, "Regulatory Research on Use of Burnup Credit for Criticality Safety in BWR Spent Fuel Transportation Packages", Proceedings of the 18th International Symposium on the Packaging and Transportation of Radioactive materials (PATRAM 2016), Kobe, Japan, September 18-23, 2016.

2. **S. Z. Ghrayeb**, V. Wilson, "Regulatory Perspective of boiling Water Reactor Peak Reactivity Credit in Spent Fuel Storage and Transportation", International Conference on Nuclear Criticality Safety, Charlotte, NC, September 13-18, 2015

3. M. Ouisloumen, A. M. Ougouag, **S. Z. Ghrayeb**, "Anisotropic Elastic Resonance Scattering Model for the Neutron Transport Equation", Nuclear Science and Engineering, 179, (2015) p. 1-26.

4. **S. Z. Ghrayeb**, A. M. Ougouag, M. Ouisloumen, K. N. Ivanov, "Multi-Group Formulation of the Temperature-Dependent Resonance Scattering Model and its Impact on Reactor Core Parameters", Annals of Nuclear Energy, 63, (2014) p. 751-762.

5. **S. Z. Ghrayeb**, M. Ouisloumen, A. M. Ougouag, K. N. Ivanov, "Multigroup Computation of the Temperature-Dependent Resonance Scattering Model (RSM) and its Implementation", PHYSOR 2012, Knoxville, TN April 15-20, 2012.

6. **S. Z. Ghrayeb,** M. Ouisloumen, A. M. Ougouag, K. N. Ivanov, "Deterministic Modeling of Higher Angular Moments of Resonant Neutron Scattering", *Annals of Nuclear Energy,* **38,** (2011) p. 2291 –2297.

7. **S. Z. Ghrayeb**, K. N. Ivanov, S. H. Levine, E. P. Loewen, "Burnup Performance of Fast Sodium Cooled Reactor by Utilizing Thorium Based Fuels", *Nuclear Technology,* **176,** (2011) p. 188-194.

8. **S. Z. Ghrayeb**, M. Ouisloumen, A. M. Ougouag, K. N. Ivanov, "Computation of the Resonant Neutron Scattering to Higher Angular Moments", invited paper, ANS Transactions, v. 105, Washington D.C., November 1-3, 2011.

9. **S. Z. Ghrayeb**, M. Ouisloumen, A. M. Ougouag, K.N. Ivanov, "Multigroup Formulation of the Resonance Scattering Model (RSM) and its Implementation", International Conference on Physics and Technology of Reactors and Applications, Fez, Morocco, September 26-28, 2011.

10. **S. Z. Ghrayeb**, M. Ouisloumen, A. M. Ougouag, K. N. Ivanov, "Effect of the Resonance Scattering Model on Reactor Core Neutronics Calculations", Proceedings of High Temperature Reactor , Prague, Czech Republic, October 18-20, 2010.

11. **S. Z. Ghrayeb**, M. Ouisloumen, A. M. Ougouag, K. N. Ivanov, "The Resonance Neutron Scattering Angular Moments Using the Deterministic Approach", ANS Transactions, v. 103, Las Vegas, NV, November 7-11, 2010.

10. **S. Z. Ghrayeb**, K. N. Ivanov, S. H. Levine, E. P. Loewen, "Assessment of Thorium-Based Fuels in Sodium-Cooled Fast Reactor", invited paper, ANS Transactions, v. 103, Las Vegas, NV, November 7-11, 2010.

11. **S. Z. Ghrayeb**, M. Ouisloumen, A. M. Ougouag, K. N. Ivanov, "Effect of the Resonance Scattering Model on Reactor Core Neutronics Calculations", Proceedings of High Temperature Reactor, Prague, Czech Republic, October 18-20, 2010.

12. F. Puente Espel, **S. Ghrayeb**, K. Ivanov, S. Tarantola, "Application of Global Sensitivity Analysis Approach to Exercise 1-2 of the OECD LWR UAM Benchmark", PHYSOR 2010, Pittsburgh, PA May 9 – 14, 2010.

13. F. Puente Espel, **S. Ghrayeb**, K. Ivanov, S. Tarantola, "Application of Global Sensitivity Analysis Approach To Exercise I-1 Of The OECD LWR UAM Benchmark", Invited paper for M&C 2009, Saratoga Springs, New York, May 3-7, 2009.

14. **S. Z. Ghrayeb**, F. Puente Espel, "Monte Carlo solutions of selected test problems for Exercise I-2", OECD/ NEA Benchmark for Uncertainty Analysis in Best-Estimate Modeling, University Park, PA, April 29 – May 1, 2009.

15. F. Puente Espel, **S. Z. Ghrayeb**, S. Tarantola, K. Ivanov, "Application of global sensitivity analysis approach to Exercise I-1", OECD/ NEA Benchmark for Uncertainty Analysis in Best-Estimate Modeling, University Park, PA, April 29 – May 1, 2009.

16. **S. Z. Ghrayeb**, K. N. Ivanov, S. H. Levine and F. Puente-Espel, Eric P. Loewen, "Improving Burnup Performance of Fast Sodium Cooled Reactor by Utilizing Thorium Based Fuels", M&C 2009, Saratoga Springs, New York, May 3-7, 2009.

17. **S. Z. Ghrayeb**, K. N. Ivanov, S. H. Levine, E. P. Loewen, "Development of Monte Carlo Models to Investigate Thorium-Based Fuel in Sodium Cooled Fast Reactors," ANS Winter Meeting 2008, Reno, Nevada, USA.

18. **S. Z. Ghrayeb**, P. S. Brantley, M. H. Kalos, "Monte Carlo Investigation of Neutron Penetration in Hydrogen" Lawrence Livermore National Laboratory, Summer 2008, UCRL-POST-2333321.

19. **S. Z. Ghrayeb**, P.S. Brantley & M. H. Kalos, "Monte Carlo Investigation of Neutron Penetration in Hydrogen" Lawrence Livermore Laboratory High Energy Density Physics Summer Group Presentation. UCRL-PRES-233322.

20. **S. Z. Ghrayeb**, S. Labov, M. Pivovaroff , "Contextually-Aware Expert-System for Automated Nuclear Threat Assessment" Lawrence Livermore National Laboratory Summer 2006. Poster Presentation-UCRL223556.