

Ahmad Ibrahim

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Summary

- Senior Neutronics Scientist (PhD) with experience in performing and leading successful R&D projects, including design analysis of different components of advanced nuclear reactors, safety and licensing evaluations of very complex nuclear systems, and developing and demonstrating viability of novel methodologies;
- extensive experience in development, implementation, and application of advanced computational methods and tools for reactor physics and radiation transport analysis of a wide range of applications including particles accelerators and advanced nuclear reactors;
- extensive experience in Monte Carlo and deterministic radiation transport modeling, hybrid Monte Carlo/deterministic techniques, Monte Carlo variance reduction techniques, activation and burnup calculations, efficiently coupling activation/burnup to radiation transport codes, generating and processing nuclear data libraries, and development and cleaning of solid geometric (CAD) models of very complex systems;
- distinctive experience in developing new theories and implementing new methods in production-level high performance computing simulation codes;
- distinctive experience in developing very efficient computational tools that couple different simulations to analyze quantities that require more than one step calculation;
- experience in reporting, documenting, and reviewing complex analyses for licensing applications and design reviews;
- excellent record in performing and delivering significant nuclear analyses for licensing applications of advanced nuclear systems;
- and very good record in developing successful funding proposals and procuring grants to support R&D activities.

Education

Ph.D. Nuclear Engineering and Engineering Physics, July 2012

University of Wisconsin-Madison

- Thesis: [Automatic Mesh Adaptivity for the Hybrid Monte Carlo/Deterministic Neutronics Modeling of Difficult Shielding Problems](#)
- Advisor: Prof. Paul Wilson
- Major: Nuclear Engineering
- Minor: Distributed between Computer Science, Mathematics, and Mechanical Engineering with emphasis on scientific computing and numerical analysis

M.S. Nuclear Engineering and Engineering Physics, May 2010
University of Wisconsin-Madison

B.S. Nuclear Engineering, May 2003
University of Alexandria, Egypt

- Grade: Distinction with First Degree of Honor

Experience

Senior Scientist, Neutron Technologies Division, Oak Ridge National – December 2021 – present

- Integration of mesh-based Activation into the Activation in Accelerator Radiation Environments (AARE) package
 - Coordinated the efforts of development of a mesh-based sequence for assessment of decay dose rates in spallation systems
- Support the Critical Decision 2 and 3 (CD2 and CD3) licensing activities of the ORNL Spallation Neutron Source Section Target Station
 - Designed storage and transportation casks for an STS target segment
 - Designed shielding configurations for STS water coolant pipes
- Next-generation open-source neutron beamline simulator
 - Coordinated the efforts of combining instrument design software packages, radiation transport packages, activation and transmutation packages, and optimization and machine learning packages to enable fast instrument design with background accounting

Product Physicist 3, Mirion Technologies – Sun Nuclear Corporation – December 2018 – November 2021

- Developing, Commissioning, and Qualifying novel state-of-the-art GPU-based Monte Carlo Dose Calculation Software for Radiotherapy QA
 - Developed state-of-the-art GPU-based Monte Carlo Dose Calculation software for Radiotherapy secondary QA calculations
 - Commissioned beam models for this novel dose calculator and verified the calculation accuracy using these beam models. Varian TrueBeam and Varian C-Series machines with M120 and HD120 multileaf collimators (MLC) and 6MV, 6FFF, 10MV, 10FFF, 15MV, and 18MV modes and Elekta Agility and MLCi2 machines.
 - Established the critical requirements for calibrating and verifying the accuracy and precision of the novel Monte Carlo dose calculator and its beam models based on guidance of some AAPM task group reports such as TG-51, TG-218, TG-157, TG-195, and others.
 - Currently verifying the critical requirements of this new code to release a prototype version in Summer 2020, During AAPM 2020.
 - Currently optimizing the performance of this novel Monte Carlo dose calculator for radiotherapy QA.
- Optimizing the design of several Sun Nuclear Corporation's products such as 3D Scanner, ArcCHECK, and others using advanced radiation transport simulations
 - Assessed the survivability of these products in intense radiation environment and improving their design for maximum performance

Senior Nuclear Engineer, Nuclear Analysis Team Lead, Phoenix LLC – November 2017- September 2018

- Leading the design of the next generation neutron radiography system
 - Designed three different multibeam neutron radiography systems based on three different candidate concepts
 - Designed the target material for the highest yield Phoenix LLC preparatory neutron radiography system through coupled charged particles and neutral particles radiation transport, activation, thermal hydraulics, and stress analyses
 - Developed and optimized nuclear analysis tools that couple neutronics and activation calculations and accelerate neutronics calculations for neutron radiography systems
- Leading a team of seven members in the design analysis and experimental validation of Phoenix neutron generation and neutron radiography systems owned by sponsors such as the US Army, the German Military of Defense, GE Hitachi Global Nuclear Fuel, Westinghouse, and SHINE Medical Technologies
 - Established the nuclear analyses and experimental validation workflow for this team
 - Validated all Phoenix LLC previous nuclear design efforts for neutron radiography systems against up-to-date experimental measurements
 - Updated all previous neutronics codes calculations by incorporating important delayed interactions that are not regularly included in production-level neutronics codes to demonstrate to Phoenix LLC sponsors that calculated data agree with experimental measurements within the statistical and experimental uncertainties
 - Attended the operation training for Phoenix LLC neutron radiography system
 - Led the nuclear design analysis of Phoenix LLC neutron generation system driving the SHINE Medical Technologies Molybdenum-99 subcritical system

Research and Development Staff, Reactor and Nuclear Systems Division (RNSD), Oak Ridge National Laboratory (ORNL) – June 2014- November 2017

- Shielding Assessment of Spallation Neutron Source (SNS) Target Station with Proton Power Uprate
 - Assessed the adequacy of the SNS target station shielding configuration with the increase of the proton energy to 1.3 GeV and the increase of SNS power to 2.3 MW.
 - Validated original analysis that assessed the adequacy of the SNS target station shielding configuration with updated methodologies, codes and data.
- Leading the ORNL RNSD neutronics program that focused on ITER licensing
 - Performed and demonstrated a variety of ITER neutronics analyses that led to the procurement of many funding grants from the ITER International Organization (ITER IO) and the US ITER domestic agency (US ITER):
 - Detailed distribution of the nuclear heating in ITER toroidal field coils.
 - Shutdown dose rates everywhere inside ITER bioshield.
 - Equivalent dose rates and dose to electronics resulting from the activated water.
 - Nuclear design of the ITER electron cyclotron heating and ion cyclotron heating systems and their transmission lines

- Development, implementation, and full-scale demonstration of the Multi-Step CADIS hybrid Monte Carlo/deterministic technique
 - Completed the development of the Multi-Step Consistent Adjoint Driven Importance Sampling (MS-CADIS) hybrid Monte Carlo/deterministic methods for shutdown dose rate simulations and developed the tools that effectively and efficiently couple radiation transport (MCNP, ADVANTG, and Denovo) and activation codes (SCALE/ORIGEN).
 - Implemented MS-CADIS in ADVANTG and demonstrated its effectiveness in dramatically accelerating shutdown dose rate analysis in full reactor facilities.
 - Validated the ORNL massively parallel computational tools that apply the MS-CADIS method to calculate the shutdown dose rates using high performance computing.

Post-Doctoral Research Associate, RNSD, ORNL – July 2012- June 2014

- Fission source convergence for used nuclear fuel criticality safety analysis
 - Developed the SCALE6.2 Sourcerer sequence that deterministically calculates a problem-dependent fission distribution to be used as the starting source in Monte Carlo eigenvalue calculations.
 - Added fission source convergence diagnostics to the SCALE code system.
 - Demonstrated the necessity of the Sourcerer approach to criticality safety analysis of canister-specific (as-loaded) used nuclear fuel problems using reliability assessments of Monte Carlo eigenvalue calculations.
- Starting the ORNL RNSD neutronics initiative that focused on ITER licensing
 - Led the ORNL efforts in submitting a successful proposal to support the neutronics analysis of the ITER International Organization that guided the procurement of the TA between the ITER IO and US ITER.
 - Led the development of the successful Laboratory Directed Research and Development proposal “transformational integrated fusion neutronics modeling and simulation” that provided RNSD with \$800K.
 - Led the ORNL and US ITER efforts in reviewing the Princeton Plasma Physics Laboratory report “Survey of Interspace Dose Rates for US-ITER Equatorial Port Diagnostics” for a DOE Performance Plan Milestone.
- Development of the Multi-Step CADIS hybrid Monte Carlo/deterministic technique
 - Developed the novel Multi-Step CADIS (MS-CADIS) hybrid Monte Carlo (MC)/deterministic technique that uses the Consistent Adjoint Driven Importance Sampling (CADIS) method but focuses on multi-step shielding analyses.
 - Demonstrated the ability of the MS-CADIS method to accurately perform the traditionally impractical shutdown dose analyses using full-scale 3-D Monte Carlo simulations.
- Development and support of the Automated VARIance reduction Generator (ADVANTG) code
 - Added the unfolding capability to the ADVANTG 3.0 geometric mapping routines to enable ADVANTG to analyze Monte Carlo models with reflecting boundaries.
 - Added the weight-window coarsening algorithm to ADVANTG 3.0.

Research Assistant, University of Wisconsin – Madison (UW-Madison) 2006-2012

- Dissertation
 - Developed the macromaterials, the deterministic mesh refinement algorithms, and the weight-window coarsening algorithm to enhance the reliability and efficiency of the CADIS and FW-CADIS hybrid techniques to enable the accurate full-scale shielding simulations of very large and geometrically complex problems.
 - Demonstrated the ability of accurately calculating the prompt dose rate throughout the entire ITER experimental facility using an FW-CADIS simulation that uses the three mesh adaptivity algorithms, eliminating the need for a world-class super computer in performing such an extremely difficult simulation.
- Other research at the UW-Madison
 - Fusion Development Facility (FDF) neutronics analysis:
Assessed the breeding ratio and the damage to the magnets in the baseline design of the FDF. The three-dimensional (3-D) neutronics analyses used the UW-Madison CAD-based Monte Carlo code, DAG-MCNP.
 - High Average Power Laser (HAPL) final optics and shielding configuration:
Assessed the impact of different design options of the Grazing Incidence Metallic Mirror (GIMM) and different biological shielding configurations on the nuclear environment at the dielectric focusing and turning mirrors of the HAPL system. The three-dimensional (3-D) neutronics analyses used the UW-Madison CAD-based Monte Carlo code, DAG-MCNP.
 - Radiation streaming through cooling pipes in ARIES compact stellarator:
Analyzed the effects of radiation damage on the shielding performance of the ARIES compact stellarator fusion power plant because of neutron streaming through the divertor He-access pipes. The 3-D neutronics analysis used DAG-MCNP and the deterministic transport code Attila.

Summer Intern, ORNL – RNSD, 2008, 2009, 2010, 2011

- Development and support of the SCALE package
 - Added the macromaterials capability, which enhances the geometry representation of the deterministic models, to SCALE/MAVRIC.
 - Extended the macromaterials approach to automatically define the adjoint sources for space-dependent responses in SCALE/MAVRIC.
 - Added the capability of calculating the Shannon entropy to SCALE/KENO for Monte Carlo eigenvalue calculations.
 - Demonstrated the significant increase in the reliability and the efficiency of eigenvalue Monte Carlo calculations using deterministic-based starting sources.
 - Evaluated candidate hybrid methods for optimizing the calculation of space- and energy-dependent reaction rates in eigenvalue Monte Carlo calculations.
 - Created a specialized development tool to SCALE for writing the variance reduction parameters created by SCALE/MAVRIC in MCNP format
- Development and support of the ADVANTG code
 - Added several new features to ADVANTG 2.0 such as response weighting, the Macromaterials approach, cell-based sources and cell-based adjoint sources, and adjoint flux collapsing.
 - Processed a 46 neutron/21 gamma group FENDL2.1 library for the Denovo code in ANISN format to be used by ADVANTG.

- Global neutronics modeling of ITER:
 - Demonstrated the applicability of coupling the CADIS and FW-CADIS hybrid Monte Carlo/deterministic techniques with CAD based Monte Carlo methods by applying ADVANTG and DAG-MCNP for calculating the nuclear heating at the ITER magnet using the UW-Madison CAD model of ITER.
 - Assessed the prompt dose rates throughout the entire ITER plant using ADVANTG.

Demonstrator, University of Alexandria, Egypt 2004-2006

- Assisted in teaching classes in the Nuclear Engineering, Chemical Engineering, and Electrical Engineering departments
 - Physical Reactor Design
 - Radiation shielding
 - Reactor Physics
 - Reactor Kinetics
 - Neutron Physics
 - Heat Transfer
 - Thermodynamics
 - Thermal Power Stations
 - Materials Science
 - Nuclear Materials
 - Reactor Engineering
 - Atomic Physics

Other Relevant Skills

Programming languages

- Expert programming abilities in OpenCL, C# .net framework, C++, C, and FORTRAN.
- Advanced user of multiple scripting and extension languages including PYTHON and BASH.
- Extensive experience in mathematical simulation programming using MatLab.

Neutronics modeling and simulation tools

- Extensive experience in developing and using neutronics modeling and activation codes such as MCNP, Attila, PARTISN/DANTSYS, Denovo, SCALE, ORIGEN, and ADVANTG.
- Acquired MCNP5.1.X and MCNP6 “source” code licenses.
- Implemented and modified codes that have been permanently added to production-level codes such as SCALE and ADVANTG.

Relevant Professional Activities

Memberships and roles

- Member of American Nuclear Society, 2006-current.
- Member of the working group in charge of writing “ANSI/ANS-6.4.2: Specification for Radiation Shielding Materials,” 2011-current.
- Elected Executive Committee Member of the ANS Fusion Energy Division (FED), serving three years term, 2015-2018.
- Membership chair of FED, 2014-2018.
- ANS Young Member Group liaison for the ANS Radiation Protection and Shielding Division, 2013-2017.
- ANS Young Member Group liaison for the ANS Fusion Energy Division 2013-2017.
- Appointed member in the national American Nuclear Society Student Section Committee (SSC), 2009-2012.
- SSC commendation chair, 2011.

- President of Wisconsin Alpha chapter of Alpha Nu Sigma, 2009-2010.

Program Chair

- Publication Chair for the 2015 International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering (M&C2015).
- Publication Chair for the 2014 Radiation Protection and Shielding topical meeting (RPSD2014).

Session Chair

- Technology of Fusion Energy Conference (TOFE) (August 21-25, 2016)
- The Joint International Conference on Mathematics and Computations (M&C), Supercomputing in Nuclear Applications (SNA) and Monte Carlo (MC) (April 19-23, 2015)
- American Nuclear Society Annual Meeting (June 7-11, 2015)
- The 18th Topical Meeting on Radiation Protection and Shielding Division (RSPD) (September 14-18, 2014)

Technical Program Committee

- 13th International Conference on Radiation Shielding (ICRS) & 19th Topical Meeting of the Radiation Protection & Shielding Division of the American Nuclear Society -2016 (RPSD) (October 3-6, 2016)
- Technology of Fusion Energy Conference (TOFE) (August 21-25, 2016)
- The Joint International Conference on Mathematics and Computations (M&C), Supercomputing in Nuclear Applications (SNA) and Monte Carlo (MC) (April 19-23, 2015)
- The 18th Topical Meeting on Radiation Protection and Shielding Division (RSPD) (September 14-18, 2014)

Students Mentoring

- Summer Internships at ORNL
 - Elliott Biondo (2014)
 - Lucas Jacobson (2015)
 - Alexandra Klein (2016)
 - Stephanie Miller (2016)
- PhD Committee Member of Elliott Biondo, The University of Wisconsin-Madison (Defended in July, 2016)

Reviewing Activities

- Guest Editor – Nuclear Science and Engineering Special Edition of M&C 2015 (2016)
- Proposal Reviewer – U.S. Department of Energy (DOE), Princeton Plasma Physics Laboratory Report “Survey of Interspace Dose Rates for US-ITER Equatorial Port Diagnostics” (2013)
- Article Reviewer
 - Nuclear Science and Engineering
 - Fusion Engineering and Design
 - Fusion Science and Technology
 - ANS Transactions
 - Nuclear Technology
 - Nuclear Fusion
 - Nuclear Engineering and Design

Honors and Awards

- Oak Ridge National Laboratory Reactor and Nuclear Systems Division (RNSD) Outstanding Performance award for role increasing RNSD funding in fusion-neutronics area (2016).

- ANS Radiation Protection and Shielding Division Best Student Paper Award, 2012 ANS Winter Meeting, San Diego, CA: “Automatic Mesh Adaptivity for Hybrid Monte Carlo/Deterministic Neutronics Modeling of Difficult Shielding Problems.”
- Best Paper/Presentation Award, 2011 ANS Student Conference, GA: “Global Evaluation of Prompt Dose Rates in ITER Using FW-CADIS.”
- Inducted into Alpha-Nu-Sigma, 2006-present.
- Certificate of Distinction from Engineering Dean and Young Scientists of America for community service-2006/2009, University of Wisconsin-Madison.
- The Shield of Engineering Syndicates awarded in the graduation ceremony to the top student of each department in the Faculty of Engineering, University of Alexandria, Egypt.
- Mohamed Sawan prize for the top nuclear engineering student with accumulated grade of “Distinction with First Degree of Honor”.
- Top of Batch Award in the Department of Nuclear Engineering, University of Alexandria, Egypt for the academic years 2000, 2001, 2002, and 2003
- The Distinction Award in The University of Alexandria, Egypt for the academic years 2000, 2001, 2002, and 2003

Selected Publications

Journal Papers

- **A. Ibrahim**, Eduard Polunovskiy, Michael J. Loughlin, Robert E. Grove, Mohamed E. Sawan, “[Acceleration of Calculation of Nuclear Heating Distributions in ITER Toroidal Field Coils Using Hybrid Monte Carlo/Deterministic Techniques](#),” *Fusion Engineering and Design*, **109-111, Part A**, 255-260 (2016).
- **Ahmad M. Ibrahim**, Douglas E. Peplow, Robert E. Grove, Joshua L. Peterson, Seth R. Johnson, “[The Multi-Step CADIS Method for Shutdown Dose Rate Calculations and Uncertainty Propagation](#),” *Nuclear Technology*, **192**, 286-298 (2015).
- **Ahmad M. Ibrahim**, Douglas E. Peplow, Joshua L. Peterson, Robert E. Grove, “[Shutdown Dose Rate Analysis Using the Multi-Step CADIS Method](#),” *Fusion Science and Technology*, **68**, 700-704 (2015).
- **Ahmad M. Ibrahim**, Paul P.H. Wilson, Mohamed E. Sawan, Scott W. Mosher, Douglas E. Peplow, John C. Wagner, Thomas M. Evans, and Robert E. Grove, “[Automatic Mesh Adaptivity for Hybrid Monte Carlo/Deterministic Neutronics Modeling of Difficult Shielding Problems](#),” *Nuclear Science and Engineering*, **181**, 1-13 (2015).
- **A. Ibrahim**, D. Peplow, and R. Grove, and P. Wilson, “[Novel Hybrid Monte Carlo/Deterministic Technique for Shutdown Dose Rate Analyses](#),” *Fusion Engineering and Design*, **89**, 1933-1938 (2014).
- **A. Ibrahim**, P. Wilson, M. Sawan, S. Mosher, D. Peplow, and R. Grove, “[Assessment of Fusion Facility Dose Rate Map Using Mesh Adaptivity Enhancements of Hybrid Monte Carlo/Deterministic Techniques](#),” *Fusion Engineering and Design*, **89**, 1875-1879 (2014).
- **Ahmad M. Ibrahim**, Mohamed E. Sawan, Scott W. Mosher, Thomas M. Evans, Douglas E. Peplow, Paul P. H. Wilson, and John C. Wagner, “[Global Evaluation of Prompt Dose Rates in ITER Using Hybrid Monte Carlo/Deterministic Techniques](#),” *Fusion Science and Technology*, **60**, 676-682 (2011).
- **Ahmad M. Ibrahim**, Scott W. Mosher, Thomas M. Evans, Douglas E. Peplow, Mohamed E. Sawan, Paul P. H. Wilson, and John C. Wagner, “[ITER Neutronics Modeling Using Hybrid Monte Carlo/S_N and CAD-based Monte Carlo Methods](#),” *Nuclear Technology*, **175**, 251-258 (2011).

- **Ahmad M. Ibrahim**, D. L. Henderson, L. A. El-Guebaly, P. P. H. Wilson, M. E. Sawan, "[Three Dimensional Analysis of Radiation Streaming Through ARIES-CS He-Access Pipes](#)," *Fusion Science and Technology*, **56**, 726-730 (2009).
- B.T. Rearden, L.M. Petrie, D.E. Peplow, K.B. Bekar, D. Wiarda, C. Celik, C.M. Perfetti, **A.M. Ibrahim**, S.W.D. Hart, M.E. Dunn, W.J. Marshall, "[Monte Carlo capabilities of the SCALE code system](#)," *Annals of Nuclear Energy*, **82**, 130-141 (2015).
- M.E. Sawan, **A. M. Ibrahim**, P.P.H. Wilson, E.P. Marriott, R.D. Stambaugh, C.P.C. Wong, "[Neutronics Analysis in Support of The Fusion Development Facility Design Evolution](#)," *Fusion Science and Technology*, **60**, 671-675 (2011).
- M. E. Sawan, **A. M. Ibrahim**, T. D. Bohm, and P. P. Wilson, "[Nuclear Assessment of Shielding Configuration Options for Final Optics of HAPL Fusion Power Plant](#)," *Fusion Science and Technology*, **56**, 756-760 (2009)
- M. Sawan, **A. Ibrahim**, T. Bohm, and P. Wilson, "[Three-dimensional nuclear analysis of the final optics of a laser driven power plant](#)," *Fusion Engineering and Design*, **83**, 1879-1883 (2008).
- M. E. Sawan, M. W. Mcgeoch, **A. M. Ibrahim**, P. P. Wilson, "[Nuclear Assessment of Final Optics of a KrF Laser Driven Fusion Power Plant](#)," *Fusion Science and Technology*, **52**, 938-942 (2007).
- L. El-Guebaly, P. Wilson, D. Henderson, M. Sawan, G. Sviatoslavsky, T. Tautges, R. Slaybaugh, B. Kiedrowski, **A. Ibrahim**, C. Martin, R. Raffray, S. Malang, J. Lyon, L. P. Ku, X. Wang, L. Bromberg, B. Merrill, L. Waganer, F. Najmabadi, and ARIES-CS Team, "[Designing ARIES-CS Compact Radial Build and Nuclear System: Neutronics, Shielding, and Activation](#)," *Fusion Science and Technology* **54**, 747-770 (2008).
- F. Najmabadi, A. R. Raffray, ARIES-CS Team: S. I. Abdel-Khalik, L. Bromberg, L. Crosatti, L. El-Guebaly, P. R. Garabedian, A. A. Grossman, D. Henderson, **A. Ibrahim**, T. Ihli, T. B. Kaiser, B. Kiedrowski, L. P. Ku, J. F. Lyon, R. Maingi, S. Malang, C. Martin, T. K. Mau, B. Merrill, R. L. Moore, R. J. Peipert, Jr., D. A. Petti, D. L. Sadowski, M. Sawan, J. H. Schultz, R. Slaybaugh, K. T. Slattery, G. Sviatoslavsky, A. Turnbull, L. M. Waganer, X. R. Wang, J. B. Weathers, P. Wilson, J. C. Waldrop III, M. Yoda, M. Zarnstorff, "[The ARIES-CS Compact Stellarator Fusion Power Plant](#)," *Fusion Science and Technology*, **54**, 655-672 (2008).

Conference Papers

- **Ahmad Ibrahim**, Tucker McClanahan, Igor Remec, "[Decay Dose Shielding Analysis with Hybrid Unstructured Mesh/Constructive Solid Geometry Monte Carlo Calculation and ADVANTG Acceleration](#)," Proceedings of 14th International Conference on Radiation Shielding and 21st Topical Meeting of the Radiation Protection and Shielding Division, Seattle, WA, September 25-29, 2022, Pages 476-479 (2022).
- **Ahmad M. Ibrahim**, Lucas J. Jacobson, Scott W. Mosher, William A. Wieselquist, "[Assessment of Multi-Step CADIS Parameter Sensitivity to Neutron Flux Spectrum in Shutdown Dose Rate Calculations](#)," *Trans. Am. Nucl. Soc.*, **115**, 1027-1030 (2016).
- **Ahmad M. Ibrahim**, Douglas E. Peplow, Joshua L. Peterson, Robert E. Grove, "[Analysis of Shutdown Dose Rate in Fusion Energy Systems Using Hybrid Monte Carlo/Deterministic Techniques](#)," Presented at dedicated session for "Best of Radiation Protection and Shielding Division 2014", *Trans. Am. Nucl. Soc.*, **112**, 609-612 (2015).
- **Ahmad M. Ibrahim**, Douglas E. Peplow, and Robert E. Grove, "[Acceleration of Shutdown Dose Rate Monte Carlo Calculations Using the Multi-Step CADIS Method](#)," Proceedings of Joint International Conference on Mathematics and Computation (M&C),

Supercomputing in Nuclear Applications (SNA) and the Monte Carlo (MC) Method, Nashville, TN, April 19-23, 2015, American Nuclear Society (2015).

- **A. M. Ibrahim**, D. Peplow, R. Grove, and S. Johnson, "[The Multi-Step CADIS Method for Shutdown Dose Rate Calculations and Uncertainty Propagation](#)," American Nuclear Society Radiation Protection and Shielding Division 2014 Topical Meeting, Knoxville, TN, September 14-18 (2014).
- **A. M. Ibrahim**, D. Peplow, Peterson, and R. Grove "[Analysis of Shutdown Dose Rate in Fusion Energy Systems Using Hybrid Monte Carlo/Deterministic Techniques](#)," American Nuclear Society Radiation Protection and Shielding Division 2014 Topical Meeting, Knoxville, TN, September 14-18 (2014).
- **A. M. Ibrahim**, D. E. Peplow, K. B. Bekar, C. Celik, D. Ilas, J. M. Scaglione, J. C. Wagner, "[Hybrid Technique in SCALE for Fission Source Convergence Applied To Used Nuclear Fuel Analysis](#)," 2013 Topical Meeting on Nuclear Criticality Safety (NCS 2013), Wilmington, NC, September 29– October 3, 2013.
- **A. M. Ibrahim**, Paul P. H. Wilson, Mohamed E. Sawan, Douglas E. Peplow, Scott W. Mosher, John C. Wagner, and Thomas M. Evans, "[Automatic Mesh Adaptivity for CADIS and FW-CADIS Neutronics Modeling of Difficult Shielding Problems](#)," Proceedings of 2013 International Conference on Advances in Mathematics, Computational Methods, and Reactor Physics, Sun Valley, ID, May 5–9, 2013, American Nuclear Society 1411-1428 (2013).
- **A. M. Ibrahim**, D. E. Peplow, and Robert E. Grove "[Novel Hybrid Monte Carlo/Deterministic Technique for Shutdown Dose Rate Calculations](#)," *Trans. Am. Nucl. Soc.*, **108**, 647-650 (2013).
- **A. M. Ibrahim**, Paul P. H. Wilson, Mohamed E. Sawan, Douglas E. Peplow, John C. Wagner, Scott W. Mosher, and Thomas M. Evans, "[Automatic Mesh Adaptivity for Hybrid Monte Carlo/Deterministic Neutronics Modeling of Difficult Shielding Problems](#)," *Trans. Am. Nucl. Soc.*, **107**, 934-937 (2012).
- **A. M. Ibrahim**, D. E. Peplow, J. C. Wagner, S. W. Mosher, T. E. Evans, "[Acceleration of Monte Carlo Criticality Calculations Using Deterministic-Based Starting Sources](#)," Proc. PHYSOR 2012, Advances in Reactor Physics, Knoxville, TN, April 15-20 (2012).
- **A. M. Ibrahim**, D. E. Peplow, J. C. Wagner, S. W. Mosher, T. E. Evans, "[Acceleration of Monte Carlo Criticality Calculations Using Deterministic-Based Starting Sources](#)," *Trans. Am. Nucl. Soc.*, **105**, 539-541 (2011).
- **A. M. Ibrahim**, D. E. Peplow, T. M. Evans, P. P. H. Wilson, and J. C. Wagner, "[Improving the \$S_N\$ Adjoint Source and Geometry Representation Capabilities in the SCALE Hybrid Shielding Analysis Sequence](#)," American Nuclear Society Radiation Protection and Shielding Division 2010 Topical Meeting, Las Vegas, NV, April 18–23 (2010).
- **A. M. Ibrahim**, S. W. Mosher, T. M. Evans, D. E. Peplow, M. E. Sawan, P. P. H. Wilson, J. C. Wagner, "[ITER Neutronics Modeling Using Hybrid Monte Carlo/ \$S_N\$ and CAD-Based Monte Carlo Methods](#)," American Nuclear Society Radiation Protection and Shielding Division 2010 Topical Meeting, Las Vegas, NV, April 18–23 (2010).
- **A. M. Ibrahim**, D. E. Peplow, T. E. Evans, J. C. Wagner, P. P. H. Wilson, "[Improving the Mesh Generation Capabilities in the SCALE Hybrid Shielding Analysis Sequence](#)," *Trans. Am. Nucl. Soc.*, **100**, 302-304 (2009).
- Elliott D. Biondo, **Ahmad M. Ibrahim**, Scott W. Mosher, and Robert E. Grove, "[Accelerating Fusion Reactor Neutronics Modeling by Automatic Coupling of Hybrid Monte Carlo/Deterministic Transport on CAD Geometry](#)," Proceedings of Joint International Conference on Mathematics and Computation (M&C), Supercomputing in

Nuclear Applications (SNA) and the Monte Carlo (MC) Method, Nashville, TN, April 19-23, 2015, American Nuclear Society (2015).

- B. T. Rearden, L. M. Petrie, D. E. Peplow, K. B. Bekar, D. Wiarda, C. Celik, C. M. Perfetti, **A. M. Ibrahim**, S. W. D. Hart, and M. E. Dunn, “[Monte Carlo Capabilities of the SCALE Code System](#),” 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).
- D. E. Peplow, **A. M. Ibrahim**, and Robert E. Grove “[Propagation of Uncertainty from a Source Computed with Monte Carlo](#),” *Trans. Am. Nucl. Soc.*, **108**, 643-646 (2013).
- Brian C. Kiedrowski, **Ahmad Ibrahim**, “[Evaluating the Efficiency of Estimating Numerous Monte Carlo Tallies](#),” *Trans. Am. Nucl. Soc.*, **104**, 325-328 (2011).
- M. E. Sawan, P. P. Wilson, T. Tautges, L. A. El-guebally, D. L. Henderson, T. D. Bohm, B. Kiedrowski, B. Smith, **A. Ibrahim**, R. Slaybaugh, E. Marriot, “[Application of CAD-Neutronics Coupling to Geometrically Complex Fusion Systems](#),” 23rd Symposium on Fusion Engineering (SOFE), San Diego, CA, May 31-June 5 (2009).
- L.A. El-Guebaly, P. Wilson, D. Henderson, M. Sawan, G. Sviatoslavsky, T. Tautges, R. Slaybaugh, B. Kiedrowski, **A. Ibrahim**, C. Martin, and the ARIES-CS Team, “[Overview of ARIES-CS In-Vessel Components: Integration of Nuclear, Economics, and Safety Constraints in Compact Stellarator](#),” IAEA-TM-32812, Proceedings of 2nd IAEA Technical Meeting on First Generation of Fusion Power Plants: Design and Technology, Vienna, Austria June 20-22 (2007).

Technical Reports

- S. W. Mosher, A. M. Bevill, S. R. Johnson, **A. M. Ibrahim**, C. R. Daily, T. M. Evans, J. C. Wagner, J. O. Johnson, and R. E. Grove, “[ADVANTG—An Automated Variance Reduction Parameter Generator](#),” ORNL/TM-2103/416, Oak Ridge National Laboratory, Oak Ridge, TN (2013).
- K. Bekar, **A. Ibrahim**, “[Design Analysis of SNS Target Station Biological Shielding Monolith with Proton Power Uprate](#),” ORNL Technical Report, SNS -106100200-TR0219-R00.
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- Katherine E. Royston, **Ahmad M. Ibrahim**, Joel M. Risner, Stephen C. Wilson, “Analysis of Radiation Transport Due to Activated Tokamak Cooling Water,” US-ITER report, iDOCS UID US_D_22YRRK_v2.0.
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