Jianwei Hu, Ph.D.

Cell: (217)494-6810; Email: hellojianwei@gmail.com

SUMMARY

Nuclear Engineer (Ph.D.) with expertises in the development and application of computational methods for reactor physics, fuel performance, nuclear safeguards, criticality safety, fuel cycle, radiation detection, and thermal-hydraulics analysis. More than 10 years of experience in modeling and analyzing nuclear fuel and reactor with various design and operating parameters, developing and applying multi-physics models to analyze nuclear fuel performance, developing nondestructive assay techniques to measure spent nuclear fuel attributes for safeguards applications. Lead and involved in several spent fuel measurement campaigns at spent fuel storage facilities. Embrace strong safety cultures and work ethics. Result- and detail-oriented. Enjoy multi-tasking and team work. Good at creative and critical thinking and coming up with practical solutions.

EDUCATION

University of Illinois at Urbana-Champaign

Ph.D., Nuclear Engineering, January 2011

- Dissertation Title: *Comprehensive Fuel Performance Model Development and Simulation for TRISO Fuel*
- Minor: Fluid Mechanics and Computational Methods
- Advisor: Professor Rizwan Uddin

M.S., Nuclear Engineering, May 2006

- Thesis Title: *Multi-Purpose Research Reactor Designs Using MCNP and ORIGEN*

Xi'an Jiaotong University (China)

B.S., Nuclear Engineering, July 2001

- Minor: American Business English
- Recipient of the highest student award in three years in a row
- Graduated with Top 2 GPA in a class of 50 students

RECENT AWARDs

- U.S. DOE National Nuclear Security Administration Joule Ward (2020)
- U.S. DOE The Secretary of Energy's Achievement Award for the Spent Fuel Nondestructive Assay Project Team(2021)

WORK EXPERIENCE

Oak Ridge National Laboratory

R&D Staff, spent fuel analysis July 2016 – present

Research and Test Reactor Group, Nuclear Energy and Fuel Cycle Division. Current supervisor: Dr. Benjamin Betzler

- **HFIR Neutronics Safety Calculations Reviews (2017-2021)**

  – Performed Independent Review in 2017-18 on Flux Tilt Analysis Calculations for HFIR HEU Cores at BOC and EOC (C-HFIR-2017-005);

  – Performed Independent Review in 2018-19 on Nuclear Heating and Reactivity Impact of Neutron-Absorbing Materials Samples in the HFIR Flux Trap (C-HFIR-2019-003);

– Performed Technical Adequacy and Independent Reviews in 2019 on Nuclear Heat Generation in a Yttrium Hydride Irradiation Experiment in the HFIR Flux Trap (C-HFIR-2019-027);

– Performed Technical Adequacy and Independent Reviews in 2020-21 on Nuclear Heating and Reactivity Impact of Enriched Minifuel TRISO Compact Experiments in the ISVXF Positions (C-HFIR-2020-027);

– Preliminarily assessed the ability of using standalone ORIGEN calculations (instead of full HFIRCON calculations) to determine the cycle-by-cycle burnups of Minifuel TRISO particles irradiated in HFIR.

- **Test the New ORIGEN Library Builder (Feb. 2021-present)**

  – A new ORIGEN library builder using modernized user interface was developed by a colleague to replace the legacy Couple code and to add new functionalities.

  – Tested the new library builder to make sure all the existing functionalities in Couple are replicated.

  – Developed a series of test cases to ensure consistent results between legacy Couple and the new code.

  – Developed a series of sample cases to illustrate the various functionalities of the new code.

  – Identified several bugs and reported them to developers.

  – Suggested an improved user interface for this new code.

- **Fuel Performance Analysis for the Versatile Test Reactor (VTR) (2019-present)**

  – Assessed and tested the existing capabilities of BISON to model the thermo-mechanical phenomena in metallic fuel and HT9 cladding.

  – Identified deficiencies in the fission gas release model in BISON for metallic fuel and helped improve the model.

  – Performed fuel performance analysis of the preliminary VTR driver fuel under normal and off-normal VTR operation conditions.

  – Documented the fuel performance analysis in two sponsor reports.

  – Identified deficiencies in the thermal creep model in BISON for HT9 cladding and reported the finding to BISON developers.

  – Performed fuel performance analysis of the refined VTR driver fuel under normal and off-normal VTR operation conditions using the updated BISON models.

- **Sensitivity and Uncertainty Analysis of Core Criticality for the Transformational Challenge Reactor (TCR) (2020)**

  – Performed sensitivity of TCR reactivity to neutron cross sections.

  – Identified applicable critical experiments for TCR criticality validation.

  – Determined the bias and bias uncertainty in the TRITON-calculated k_{eff} for the TCR core.

  – Documented the work in the sponsor report and presented the results at the ANS winter meeting.

- **Development of CTFFuel to perform heat transfer in UO_2 fuels and in accident tolerant fuel (ATF) for CASL's VERA core simulator (2018-20)**

  – Reviewed the existing thermo-mechanical models in CTFFuel and identified deficiencies.

  – Added models into CTFFuel to account for clad creep, fuel swelling, thermal expansion, fuel thermal conductivity degradation, and etc.

– Added new capabilities into CTFFuel to account for depletion (or irradiation) effects during a series of time steps and to account for restart of fuel cycle.

– Compared the temperature results from the updated CTFFuel to those of BISON and saw dramatic improvements in agreements.

– Reviewed current ATF fuel and cladding choices of industry interest and identified priority ATF materials for CTFFuel development.

– Modified the CTFFuel code infrastructure to treat fuel and cladding materials other than UO_2 and Zircaloy.

– Added thermal conductivity models for a select set of ATF materials.

– Modified the user interface to accept different combinations of ATF fuel and cladding materials.

– Developed regression and unit tests to ensure the added models perform as expected.

– Used GitLab for version controls and to manage test cases.

– Documented work in two milestone reports.

– Presented part of the results at the 2019 Top Fuel Conference.

- **Spent Fuel Nondestructive Assay (NDA) Project for Safeguards (2016-20)**

  – Gathered detailed fuel design and operating condition data (e.g., pin-by-pin burnup distribution) for the 25 PWR and 25 BWR spent fuel assemblies for advanced NDA testing in Sweden.

  – Developed a set of ORIGEN libraries using detailed TRITON models that accounted for different fuel enrichments, moderator densities, and soluble boron concentrations.

  – Utilized the operator-provided pin-by-pin burnup and enrichment distributions, and cycle-by-cycle power histories of all assemblies; generated the isotopics and neutron and gamma source terms for each fuel rod segment.

  – Provided the isotopics and neutron/gamma source terms to the NDA developers to construct high-fidelity MCNP models to predict the detector responses.

  – Calculated the decay heat and total Pu quantities from all 50 assemblies and compared them to CASMO-SIMULATE SNF results and observed good agreements.

  – Developed the Differential Die-away Self-Interrogation (DDSI) response functions using MCNP models.

  – Updated the ORIGEN data analysis module using the new response functions to predict the DDSI neutron signals, which were compared against the measured signals and saw good agreements.

  – Documented the results in several sponsor reports and conference papers.

- **Development of the ORIGEN Data Analysis Module for Spent Fuel Safeguards (2016-21)**

  – Developed methods to account for neutron multiplications in spent fuel assemblies; developed empirical correlations to account for gamma detector nonlinear responses.

  – Designed and participated in the Fork detector measurements of the 50 spent fuel assemblies in Sweden.

  – Analyzed the Fork detector neutron and gamma measurement data from 300 BWR and PWR fuel assemblies using the ORIGEN Module with the new methods and saw dramatic improvements in comparisons to measured data.

  – Developed ORIGEN libraries for VVER-440 assemblies.

  – Compared the ORIGEN calculated isotopics from VVER spent fuel samples against measured quantities to validate the ORIGEN libraries.

– Developed new neutron and gamma response functions for Fork detector measurement of VVER assemblies using detailed MCNP detector and fuel assembly models.

– Analyzed the Fork detector measurements of VVER assemblies and compared the predicted neutron/gamma signals to measured quantities and saw good agreements.

– Developed new neutron and gamma response functions for the Passive Neutron Albedo Reactivity (PNAR) detector measurement of BWR assemblies using detailed MCNP detector and fuel assembly models.

– Analyzed the PNAR detector measurements of BWR assemblies and compared the predicted neutron/gamma signals to measured quantities and saw good agreements.

– Documented the results in several sponsor reports, conference papers, and journal papers.

- **Measuring Spent Fuel Rods in a Hot Cell at ORNL using Fork detectors for Safeguards Applications (2016-17)**

  – Performed various project lead functions (e.g., proposal, scheduling, budgeting, team assembling and managing, and etc.) throughout this project.

  – Acquired a standard Fork detector from ANTECH in the United Kingdom and ensured "made to specification" and timely delivery.

  – Co-designed a Fork detector using alternative neutron and gamma detectors with ANTECH and General Electric and ensured timely delivery and vendor testing of the product.

  – Discovered a cable failure due to manufacture detects and re-ordered a replacement cable with alternative designs.

  – Arranged international transport of fissile materials (contained in these neutron detectors) and subsequent accountancy and tagging of these materials.

  – Designed the experiments in the ORNL Radiation Standards and Calibration Laboratory (RASCAL) and the hot cell.

  – Designed the moderator blocks and support grids to assemble 13-ft-long spent fuel rods into mini-assemblies and had them manufactured in a hardware shop.

  – Calibrated both Fork detectors at RASCAL using known neutron and gamma sources; identified the root cause to the nonlinear response in the gamma detector in the standard Fork detector. Sponsor reported the finding to the IAEA.

  – Measured all 25 PWR fuel rods and 1 MOX rod using both Fork detectors at multiple axial locations with and without the moderator block.

  – Assembled a subset or all of the fuel rods into 2×2, 3×3, and 5×5 mini-assemblies and repeated the Fork detector measurements at multiple axial locations.

  – Replaced several fuel rods with stainless steel rods in the 5×5 mini-assembly and performed the measurements, which provided valuable data to assess Fork detectors' capability to detect "partial defects". Such data could not be obtained through other means.

  – Documented the work in a sponsor report.

- **Analysis of Radiochemical Assay (RCA) data in Spent Fuel Samples (2016-17)**

  – Reviewed the RCA data measured by a different group at ORNL for 2 samples from an irradiated Calvert Cliff fuel rod.

  – Identified and corrected an error in the measured Pu238 mass due to inferences from two other Pu isomers.

  – Identified and corrected an error in the reported axial locations of the two samples.

  – Performed depletion calculation on the hosting assembly using detailed operating conditions using SCALE/TRITON and calculated the isotopics in the two samples.

  – Compared the calculated compositions to measured quantities for SCALE 6.2 benchmarking.

– Published the results in journal paper.

Oak Ridge National Laboratory
Associate R&D Staff, spent fuel analysis August 2013 – July 2016
Reactor Physics Group, Reactor and Nuclear System Division. Supervisor: Mr. Stephen Bowman

- Surveyed the attributes of spent fuel assemblies in all spent fuel assemblies included in the US GC-859 database and identified representative attributes for these assemblies.
- Generated reference solutions for spent fuel isotopics, decay heat, neutron and gamma source terms based on the representative attributes.
- Published a NUREG report to summarize the US spent fuel attributes and to provide the reference solutions to spent fuel source terms.
- Assessed impact of nuclear data uncertainties on calculated spent fuel isotopics and published the results in a journal paper.
- Tested the newly-developed the ORIGAMI code to perform 3D depletion calculations using user-provided pin-by-pin burnup distributions and provided a few key improvement suggestions, which were adopted by the code developer.
- Calculated high-fidelity neutron and gamma source terms in spent nuclear fuels for NDA response simulation. Compared calculated gamma spectra to measurements, and good agreements have been observed.
- Authored a technical report on generation of spent nuclear fuel assembly standard for advanced NDA Instrument calibration. Identified the most important factors contributing to uncertainties in calculated nuclide compositions and quantified those uncertainties.
- Modified the algorithms to simulate the expected neutron and gamma responses in Fork detector when it was used to measure spent fuel assemblies.
- Developed models to calculate Fork detector count rates, and compared them to measurements.
- Identified sources that cause discrepancies between calculation and measurement of Fork detector. Improved Fork detector's capability to detect fuel diversions.

Oak Ridge Institute for Science and Education
Postdoctoral Research Associate July 2012 – August 2013
Reactor Physics Group, Reactor and Nuclear System Division. Supervisor: Mr. Ian Gauld

- Mentored a PhD student (e.g., tasking, scheduling, technical assistance) and taught him how to use MCNP for detector modeling.
- Created a well-characterized spent fuel nuclide library based on detailed fuel design information and operating history for advanced nondestructive assay calibration. Studied the impacts of the neighboring assemblies on the burnup gradient and isotopic content in the target assembly. This work will help to calibrate the advanced nondestructive assays, which are developed for international nuclear safeguards professionals.
- Created 3D nuclide libraries using pin-by-pin depletion calculations on Korean spent fuels based on utility-provided burnup "pin-map".
- Calculated the neutron and gamma count rates of the Fork detector from various types of spent nuclear fuel assemblies and compared to measured count rates. Improved the calculation models and enhanced the nuclear safeguards capability of the Fork detector.
- Performed depletion analysis on Calvert Cliffs fuel samples and compared the isotopic mass results to the destructive analysis results.
- Performed decay heat analysis of spent fuel including the decay heat from activated cobalt and certain fission products.
- Generated ORIGEN cross section libraries for seven different BWR assembly types based on detailed fuel designs, and validated the libraries by comparing the predicted

decay heat to measurements. This work will help to address issues associated with the storage and transportation of U.S. civilian nuclear wastes.

Los Alamos National Laboratory
Postdoctoral Research Associate Feb. 2011 – July 2012
Spent Nuclear Fuel Team, Nuclear Nonproliferation Division. Supervisor: Dr. Stephen Tobin

- Performed photon transport in spent fuel assemblies and calculated gamma dose in the ion chambers.
- Completed the prototype design of the Californium Interrogation Prompt Neutron (CIPN) detector, planning to fabricate the detector and take it to field test in a spent fuel facility in S. Korea.
- Improved the Signal-to-Background ratio for the Assembly Interrogation Prompt Neutron (AIPN) assay to quantify fissile content in spent fuel, and developed a technical report of this technique for the sponsor.
- Improved understanding of the underlying physics of the Self-Interrogation Neutron Resonance Densitometry (SINRD) detector by introducing innovative ways to quantify signal composition and spatial sensitivity, also improved the MCNPX simulation efficiency by a factor of two.

Graduate Research Assistant May 2009 – Jan. 2011
Spent Nuclear Fuel Team, Nuclear Nonproliferation Division. Supervisor: Dr. Stephen Tobin

- Characterized PWR spent fuel assemblies, including variation of burnup profile, actinide neutron sources, and neutron absorbers due to different burnup and cooling time.
- Completed the conceptual design of the Californium Interrogation Prompt Neutron (CIPN) detector to measure fissile content in spent fuel assemblies for nuclear safeguards applications.
- Quantified detector response with 64 virtual spent fuel assemblies using MCNPX.
- Introduced innovative ways to account for parasitic absorptions in spent fuel, and achieved coherent relation between count rate and fissile content among all spent fuel assemblies.

Graduate Research Assistant Dec. 2007 – April 2009
Nuclear & Particle Physics Group. Supervisor: Dr. Anna Hayes

- Added new capability to the burnup code CINDER to track ternary fission, which significantly improved the accuracies in predicting helium production in nuclear fuels.
- Developed reactor physics models and calculated fission gas production in three different nuclear fuels using coupled MCNP5 and the modified CINDER.
- Processed ENDF cross sections using NJOY to generate temperature-dependent cross sections.

University of Illinois at Urbana-Champaign
Ph.D. Candidate Dec. 2007 – Jan. 2011
Department of Nuclear, Plasma and Radiological Engineering. Advisor: Dr. Rizwan Uddin

- Developed a multi-dimensional, multi-physics, and comprehensive model to evaluate the fuel performance of TRISO fuel.
- Performed burup calculation using MCNPX (with CINDER) to calculate fast neutron fluence, k_{eff}, inventory of various important isotopes.
- Developed 3D thermal model to calculate temperature distribution in both pebble and TRISO under different conditions.
- Calculated fission gas generation, release and pressure buildup in TRISO fuel.

– Modified the finite element code FEAP to include irradiation-induced shrinkage and creep. Developed 3D stress models to calculate stresses in a TRISO particle under static, transient and defective conditions. Evaluated the failure probability of a TRISO particle based on the stress results.

Doll Research Center, Schlumberger, Cambridge, MA
Nuclear Modeler Intern May 2007 – Aug. 2007
Nuclear Detector Group. Supervisor: Dr. Brad Roscoe

– Modeled a gamma detector using MCNP5 for oil field application
– Performed source calculation and simulated detector response in different earth formations
– Benchmarked simulation results against experimental data and achieved good agreements

University of Illinois at Urbana-Champaign
Research Assistant Aug. 2003 – Nov. 2007
Department of Nuclear, Plasma and Radiological Engineering. Advisor: Dr. Rizwan Uddin
Project I: Coupled Neutronics and Thermal-Hydraulics Simulations Using Monte Carlo and CFD

– Developed an interface code to couple MCNP5 and FLUENT for high fidelity reactor simulation
– Calculated heat generation in the fuel using MCNP5, read in heat source using UDF, and then calculated temperature in both fuel and coolant using FLUENT.
– Updated neutron cross section library using NJOY, with which recalculated heat generation using MCNP5, and then iterated until convergence obtained

Project II: ANL SMFR (Small Modular Fast Reactor) modeling

– Modeled the entire reactor core in 3D with sub-pin level details using MCNP5
– Performed core life and fuel burnup analysis using Monteburns on Linux cluster

Project III: Australian Open Pool Research Reactor (OPAL) simulation and modification

– Developed 3D reactor core and performed criticality calculation
– Calculated neutron flux distribution, and performed fuel burnup calculation and analysis
– Modified core design to enhance some desired features in the flux trap, such as higher fluxes, better material irradiation capabilities, etc.

Tsinghua University, Beijing, China
Research Assistant Sep. 2001 – May 2003
Institute of Nuclear Energy Technology. Advisor: Dr. Zhang Zuo Yi

– Studied public acceptance of nuclear energy
– Explored desired futures for next generation reactors, appealing government support and public acceptance
– Recipient of the highest student award: Areva Nuclear Scholarship

Xi'an Jiaotong University, Xi'an, China
Graduate Project, Jan. 2001 – June 2001
Department of Nuclear Engineering. Supervisor: Dr. Qiu Sui Zheng

– Solved neutron flux using point-reactor model for a slab reactor
– Calculated temperature distributions over the core and assessed its natural circulation capability

COMPUTER SKILLS/TECHNICAL COMPETENCIES

Programming: FORTRAN, PERL, C, MPI, MATLAB
Operating Systems: Windows, Linux, Linux Cluster
Engineering Codes: MCNP, BISON, ANSYS, SCALE (TRITON, ORIGEN, KENO, TSUNAMI), HFIRCON, MONTEBURNS, CINDER, NJOY, FLUENT, FEAP, ABAQUS

PROFESSIONAL AFFILIATIONS

American Nuclear Society Institute of Nuclear Materials Management

PEER-REVIEW ACTIVITIES

Served as technical reviewer for the following international scientific journals:
Nuclear Engineering and Design *Annals of Nuclear Energy*
Nuclear Science and Techniques *Nuclear Instrument and Methods*
International Journal of Nuclear Energy Science and Technology

CITIZENSHIP

Citizenship: USA

LIST of PUBLICATIONS

- I.T. Greenquist, K.M. Cunningham, **J. Hu**, and J.J. Powers, "A Metallic Fuel Performance Benchmark Problem Based on the IFR-1 Experiment," accepted for publication by Journal of Nuclear Materials in March 2021.
- **J. Hu**, G. Ilas, I.C. Gauld, "Analysis of PNAR spent fuel safeguards measurements using the ORIGEN data analysis module," ORNL/TM-2020/1834, Oak Ridge National Laboratory (2020). https://info.ornl.gov/sites/publications/Files/Pub149854.pdf.
- **J. Hu**, B. Ade, B. Betzler, "Sensitivity and Uncertainty Analysis of Core Criticality for the Transformational Challenge Reactor," ANS Winter Meeting, 2020.
- **J. Hu**, R. Salko, A. Wysocki, and B. Collins, "Improvements to CTFFuel to support ATF concepts,", CASL-U-2020-1969-000, Oak Ridge National Laboratory, July 2020.
- **J. Hu**, I. C. Gauld, S. Vaccaro, T. Honkamaa and G. Ilas, "Validation of ORIGEN for VVER-440 Spent Fuel with Application to Fork Detector Safeguards Measurements," ESARDA Bulletin, no. 60, pp. 28-42, 2020. https://doi.org/10.2760/217080.
- **J. Hu**, R. Salko, S. Stimpson, A. Godfrey, A. Wysocki, and B. Collins, "Improvements in CTFFuel for Core Follow Applications in VERA," In Proc. of Top Fuel, Seattle, WA, September 2019.
- **J. Hu**, R. Salko, S. Stimpson, A. Godfrey, A. Wysocki, and B. Collins, "Prepare CTFFuel for Core Follow Applications," CASL-X-2019-1854-000, Oak Ridge National Laboratory, May 2019.
- S. Vaccaro, I. C. Gauld, **J. Hu**, P. De Baere, J. Peterson, P. Schwalbach, A. Smejkal, A. Tomanin, A. Sjöland, S. Tobin and D. Wiarda, "Advancing the Fork Detector for Quantitative Spent Nuclear Fuel Verification," Nuclear Inst. and Methods in Physics Research, A, Vol. 888; pp. 202–217, 2018. https://doi.org/10.1016/j.nima.2018.01.066.
- **J. Hu**, J.M. Giaquinto, I.C. Gauld, G. Ilas, T.J. Keever, "Analysis of new measurements of Calvert Cliffs spent fuel samples using SCALE6.2," Annals of Nuclear Energy, 106, 2017.
- **J. Hu**, I.C. Gauld, J.L. Peterson, S.M. Bowman, "US Commercial Spent Nuclear Fuel Assembly Characteristics: 1968-2013", NUREG/CR-7227, ORNL/TM-2015/619. https://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr7227/index.html
- **J. Hu**, et al., "High-Fidelity Modelling of Spent Fuel Assemblies for Advanced NDA Instrument Testing," In Proc. of Advances in Nuclear Nonproliferation Technology and Policy Conference, Santa Fe, NM, 2016

- I. C. Gauld, J. M. Giaquinto, J. S. Delashmitt, **J. Hu**, T. J. Haverlock and C. Romano, "Re-evaluation of spent nuclear fuel assay data for the Three Mile Island unit 1 reactor and application to code validation," Annals of Nuclear Energy, vol. 87, pp. 267-281, 2016.
- S. Vaccaro, **J. Hu**, J. Svedkauskaite, A. Smejkal, P. Schwalbach, P. De Baere and I. C. Gauld, "A New Approach to Fork Measurements Data Analysis by RADAR-CRISP and ORIGEN Integration," IEEE Trans. Nucl. Sci., vol. 61, no. 4, pp. 2161-2168, 2014. https://ieeexplore.ieee.org/document/6851223.
- **J. Hu**, I.C. Gauld, "Impact of Nuclear Data Uncertainties on Calculated Spent Fuel Nuclide Inventories and Advanced NDA Instrument Response," Oak Ridge National Laboratory Technical Report, ORNL/LTR-2014/14 (2014).
- **J. Hu**, I.C. Gauld, J.E. Banfield, and S.E. Skutnik,"Developing Spent Fuel Assembly Standards for Advanced NDA Instrument Calibration," Oak Ridge National Laboratory Technical Report, ORNL/TM-2013/576 (2013).
- **J. Hu**, S.J. Tobin, A.M. LaFleur, H.O. Menlove, and M.T. Swinhoe, "Performance Assessment of Self-Interrogation Neutron Resonance Densitometry for Spent Nuclear Fuel Assay," *Nuclear Inst. and Methods in Physics Research, A,* Vol. 729, Pages 247-253, ISSN 0618-9002 (2013).
- S. Vaccaro, **J. Hu**, J. Svedkauskaite, A. Smejkal, P. Schwalbach, P. De Baere, and I.C. Gauld, "New approach to Fork measurements data analysis by RADAR-CRISP and ORIGEN integration," in Proceedings of Advancements in Nuclear Instrumentation Measurement Methods and their Applications, Marseille, Palais des Congres, France, ISBN 978-1-4799-1046-5 (2013).
- S.J. Tobin, H. Menlove, M. Swinhoe, H. Trellue, M. Humphrey, A. Belian, T. Burr, L. Campbell, W. Charlton, J. Eigenbrodt, A. Favalli, N. Fischer, J. Galloway, I. Gauld, J. Gerhart, S. Grape, Y. Ham, J. Hendricks, V. Henzl, D. Henzlova, **J. Hu**, A. Hunt, P. Jansson, "Prototype Development and Field Trials under the Next Generation Safeguards Initiative Spent Fuel Non-Destructive Assay Project," in Proceeding of ESARDA 35th annual meeting, Bruges, Belgium (2013).
- **J. Hu**, S.J. Tobin, H.O. Menlove, D. Henzlova, J. Gerhart, M.T. Swinhoe and S. Croft, "Developing the Californium Interrogation Prompt Neutron Technique to Measure Fissile Content and to Detect Diversion in Spent Nuclear Fuel Assemblies," *J. of Nucl. Mater. and Manage.,* Vol. Xl, No. 3, Issue of Spring 2012.
- **J. Hu**, D. Henzlova, S.J. Tobin, H.D. Kim, et al., "Customized Design and Simulated Performance of the 252Cf Interrogation with Prompt Neutron Detector for Spent Fuel Management at Post Irradiation Examination Facility in the Republic of Korea," in Proceedings of Institute Nuclear Materials Management 53rd Annual Meeting, Orlando, FL (2012).
- A. Favalli, D. Lee, **J. Hu**, H.R. Trellue, S.J. Tobin, "On Determination of Initial Enrichment, Burnup, Cooling Time of PWR Spent Fuel Assembly by Analysis of Passive Gamma Spectra and Neutron Count Rate, in Proceedings of Institute Nuclear Materials Management 53rd Annual Meeting, Orlando, FL (2012).
- **J. Hu**, H.R. Trellue, S.J. Tobin, TJ Ulrich, A.M. Lafleur, C.R. Freeman, H.O. Menlove and M.T. Swinhoe, "The Performance of Self-Interrogation Neutron Resonance Densitometry in Measuring Spent Fuel," *J. of Nucl. Mater. and Manage.,* Vol. Xl, No. 3, Issue of Spring 2012.
- T. Burr, J.L. Conlin, **J. Hu**, J. Galloway, V. Henzl, H.O. Menlove, M.T. Swinhoe, S.J. Tobin, H.R. Trellue, and TJ Ulrich, "Uncertainty Quantification for New Approaches to Spent Fuel Assay," *J. of Nucl. Sci. and Eng.,* 172, 180-192 (2012).
- **J. Hu**, "Comprehensive Fuel Performance Model Development and Simulation for TRISO Fuel", *PhD Dissertation,* University of Illinois at Urbana-Champaign, Nuclear Engineering (January 2011).
- **J. Hu**, S.J. Tobin and H.O. Menlove, "Quantifying Fissile Content in Spent Nuclear Fuel Assemblies Using ^{252}Cf Interrogation with Prompt Neutron Detection," in *Proc. Global 2011,* Makuhari, Japan (2011).
- **J. Hu** and Rizwan-uddin, "Three-Dimensional Thermal Modeling of TRISO Fuel in Pebble-bed Reactors," in *Proc. Global 2011,* Makuhari, Japan (2011).

- **J. Hu**, S.J. Tobin, H.O. Menlove, and S. Croft, "Determining Plutonium Mass in Spent Fuel Using 252Cf Interrogation with Prompt Neutron Detection," in Proceedings of Institute Nuclear Materials Management 52 Annual Meeting, Palm Desert, CA (2011).
- **J. Hu**, C.R. Freeman, TJ Ulrich, S.J. Tobin, A.M. Lafleur, W.E. Koehler, H.O. Menlove and M.T. Swinhoe, "Assessment of the Self-Interrogation Neutron Resonance Densitometry Technique for the Next Generation Safeguards Initiative Spent Fuel Research Effort," Los Alamos National Laboratory Technical Report, LA-UR 11-06177 (2011).
- T.J. Ulrich II, **J. Hu**, A.M. LaFleur, S.J. Tobin, "Quantifying the Plutonium Mass in Spent Fuel by Combining Prompt Neutron, Neutron Densitometry and Passive Gamma Measurements," Los Alamos National Laboratory Technical Report, LA-UR 11-03913 (2011).
- S. Croft, P. Blanc, L.W. Campbell, J.R. Cheatham, D. Chichester, J.L. Conlin, M.H. Ehinger, L.G. Evans, C.R. Freeman, C. J. Gesh, **J. Hu**, A. Hunt, A.M. LaFleur, T.H. Lee, "A Technical Review of Non-Destructive Assay Research for the Characterization of Spent Nuclear Fuel Assemblies Being Conducted Under the US DOE NGSI," in Proceedings of Waste Management 2011 Conference, Phoenix, AZ (2011).
- **J. Hu**, H. Mourad and Rizwan-uddin, "Stress Analysis of TRISO Particle Using Modified FEAP," in *Trans. Amer. Nucl. Soc.* (2011).
- W. Koehler, S.J. Tobin, **J. Hu**, H.O. Menlove, "Viability of using CIPN as a delayed neutron detector," in Proceedings of Institute of Nuclear Materials Management 52 Annual Meeting, Palm Desert, CA (2011).
- J.L. Conlin, S.J. Tobin, A.M. Lafleur, **J. Hu**, T. Lee, N.P. Sandoval, M.A. Schear "On Using Code Emulators and Monte Carlo Estimation to Predict Assembly Attributes of Spent Fuel Assemblies for Safeguards Applications," *J. of Nucl. Sci. and Eng.,* vol.169, iss.3, p.314-328, (2011).
- **J. Hu**, S.J. Tobin, and S. Croft, "Quantifying Fissile Content in Spent Using 252Cf Interrogation with Prompt Neutron Detection," in Proceedings of Plutonium Future, Keystone, CO (2010).
- S.J. Tobin, P. Blanc, J. Conlin, L. Evans, **J. Hu**, T. Lee, A. LaFleur, H. Menlove, "Determining Plutonium Mass in Spent Fuel with Non-destructive Assay Techniques NGSI Research Overview and Update on NDA Techniques, Part I," International Atomic Energy Agency Nuclear Safeguards Symposium, IAEA-CN-184/130. (2010)
- V. Mozin, S.J. Tobin, L.W. Cambell, J.R. Cheatham, C.R. Freeman, C.J. Gesh, A. Hunt, B. Ludewigt, E. Reedy, H. Selpel, L. Smith, J. Sterbentz, J. Vujic, J. White, P. Blanc, S. Croft, J. Conlin, L. Evans, M. Fensin, **J. Hu**, T. Lee, A. LaFleur, "Determining Plutonium Mass in Spent Fuel with Nondestructive Assay Techniques NGSI Research Overview and Update on NDA Techniques, Part II," International Atomic Energy Agency Nuclear Safeguards Symposium, IAEA-CN-184/137. (2010)
- **J. Hu**, S.J. Tobin, H.O. Menlove and S. Croft, "Determining Plutonium Mass in Spent Fuel Using Cf-252 Interrogation with Prompt Neutron Detection," in *Proceedings of INMM 51st Annual Meeting,* Baltimore, MD. (2010).
- P. Blanc, T.J. Tobin, T. Lee, **J. Hu**, J. Hendricks, S. Croft, "Delayed neutron detection with an integrated differential die-away and delayed neutron instrument," in Proceedings of INMM 51st, Annual Meeting, Baltimore, MD (2010).
- **J. Hu**, A.C. Hayes, W. Wilson and Rizwan-uddin, "Fision Gas Production in Reactor Fuels Including the Effects of Ternary Fission," *J. of Nucl. Eng. and Design.,* vol.240, iss.11, p.3751-3757, (2010).
- **J. Hu**, Rizwan-uddin, "Fission Gas Production in Reactor Fuels," in *Trans. Amer. Nucl. Soc.,*, Atlanta, GA (2009).
- **J. Hu**, Rizwan-uddin, "Coupled Neutronics and Thermal-Hydraulics Simulations Using MCNP and FLUENT," in *Trans. Amer. Nucl. Soc.,* v 98, p 606-608 (2008).
- **J. Hu**, Rizwan-uddin, "Modeling of ANL Small Modular Fast Reactor," in *Trans. Amer. Nucl. Soc.,* v 96, p 647-648 (2007).

- **J. Hu**, "Multi-purpose Research Reactor Designs Using MCNP and ORIGEN," Master thesis, University of Illinois at Urbana-Champaign, Nuclear Engineering (2006).
- J. Griffith, **J. Hu**, N. Karancevic, F.E. Teruel, Y. Yan, J. Stubbins, and Rizwan-uddin, "Research and Virtual Reactor Design at UIUC (invited)," Transactions of the American Nuclear Society, v 93, p 873-875, Transactions of the American Nuclear Society - Winter Meeting (2005).
- **J. Hu**, Rizwan-uddin, "A Multipurpose Research Reactor Design (invited)," in *Proc. M&C 2005, Int. Topical Meeting on Mathematics and Computations, Supercomputing, Reactor Physics and Nuclear and Biological Applications,* Avignon (2005).
- **J. Hu**, F.E. Teruel, Rizwan-uddin, "Reactor Design Efforts at UIUC (invited)," in *Trans. Amer. Nucl. Soc.,* v 92, p 154-156 (2005).