

Hatice Akkurt
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Education

Ph.D. in Nuclear Engineering and Radiological Sciences, 2002,
University of Michigan

Certificate of Complex System Studies, 2001, University of Michigan

M.S. in Nuclear Engineering, 1998, University of Texas at Austin

M.S. in Nuclear Engineering, 1996, Hacettepe University, Turkey

B.S. in Nuclear Engineering, 1994, Hacettepe University, Turkey

Experience

7/2005-present

Oak Ridge National Laboratory
Research and Development Staff

- Phantom modeling project: Developed PIMAL – Mathematical Phantom with Moving Arms and Legs in order to assess the dose for realistic exposure geometries. Developed an accompanying Graphical user Interface to assist the user with radiation transport simulations using MCNP. Developed a hybrid phantom model, which uses combination of voxelized and mathematical elements to describe the human anatomy.
- Heterogeneous Layering problem: The initial focus is to develop an algorithm to determine the water content and depth for Lunar and Planetary characterization purposes. The ultimate goal is to develop an algorithm for determining the composition for heterogeneous layering problem.

1/2002-7/2005

Princeton Technology Center, Schlumberger

Nuclear Modeler (1/2002-6/2003)/Senior Nuclear Modeler (6/2003-7/2005)

- Worked on concept and feasibility studies for new tool and algorithm development for oil-well logging problems. Performed steady-state and time-dependent neutron and photon transport computations, for oil-well logging tools, using MCNP and McBend Monte Carlo codes. Setup a Linux cluster for performing parallel MCNP computations and was the system administrator for the system. Developed a user interface program using HTML and JavaScript to generate MCNP inputs for oil-well logging tools.

- Coordinated laboratory measurements to characterize tool response and to benchmark computational results. Performed data analysis for these measurements.
- Participated in feasibility and design studies of using an instrument, similar to oil-well logging tools with pulsed neutron generators, for Lunar and Planetary characterization purposes. This work is a collaborative team effort between scientist and engineers from NASA, several universities, and institutions.
- Elected as Schlumberger Eureka Nuclear Modeling Community leader in 2004 and re-elected in 2005. Responsibilities included creating and maintaining an internal web site for computational tools, evaluation of codes and new releases, preparation of semi-annual community newsletter, and organization of annual Nuclear Community meeting.

6/1999-12/2001 **University of Michigan**, Nuclear Engineering and Radiological Science Dept.
Graduate Research Assistant

- Worked on a project for the mathematical and computational modeling aspects of large sample Prompt Gamma Neutron Activation Analysis (PGNAA) for material characterization purposes.
- Developed an iterative algorithm, which solves the composition problem for large samples using a combination of measured and computed quantities.
- Tested the developed method with proof-of-principle measurements.
- Performed sensitivity analysis studies to determine the robustness of the method.

5/2000-8/2000 **Argonne National Laboratory-West (ANL-W)**
Summer Intern

- Organized and performed neutron activation measurements for large samples to test and validate the developed algorithm.

1/1997-6/1999 **University of Texas at Austin**, Nuclear Engineering Department
Graduate Research/Teaching Assistant

- Worked on a project for the Disposition of Excess Weapon Plutonium and Plutonium Utilization in Water Reactors in the form of MOX fuel. Performed criticality benchmark computations using MCNP for this project. Performed sensitivity calculations using CSASIX module of SCALE.
- Assisted in teaching undergraduate courses in engineering computational methods and programming.

1/1994-12/1996 **Hacettepe University**, Nuclear Engineering Department
Graduate Research/Teaching Assistant

- Developed a FORTRAN program to simulate a PWR with all components.
- Improved the control model using neural networks.
- Assisted in teaching heat transfer, thermodynamics, nuclear reactor engineering, and reactor analysis courses at the undergraduate level.

Publications

Journal Articles

H. Akkurt, J. C. Wagner, and K. F. Eckerman, "Hand-Held Instruments for Landmine Detection: View from Radiation Dosimetry," *Nuclear Instruments and Methods in Physics Research A* **579**, 391-394, 2007.

H. Akkurt, J. L. Groves, J. Trombka, R. Starr, L. Evans, S. Floyd, R. Hoover, L. Lim, T. McClanahan, R. James, T. McCoy, J. Schweitzer, "Pulsed Neutron Generator System for Astrobiological and Geochemical Exploration of Planetary Bodies", *Nuclear Instruments and Methods in Physics Research-B*, **241**, 232-237, 2005.

J. P. Holloway and H. Akkurt, "The fixed point formulation for large sample PGNA, Part 1: Theory", *Nuclear Instruments and Methods in Physics Research-A*, **522**, 529-544, 2004.

H. Akkurt, J. P. Holloway, and L. E. Smith, "The fixed point formulation for large sample PGNA, Part 2: Measurements", *Nuclear Instruments and Methods in Physics Research-A*, **522**, 545-557, 2004.

H. Akkurt and U. Colak, "PWR system simulation and parameter estimation with neural networks", *Annals of Nuclear Energy*, **29**, (17), 2087-2103, 2002.

H. Akkurt and N. M. Abdurrahman, "Benchmark calculations of ESADA single region MOX critical experiments," *Nuclear Technology*, **127**, 301-314, 1999.

Conference Papers (Full Papers)

J. I. Trombka, R. D. Starr, J. Groves, H. Akkurt, L. G. Evans, T. J. McCoy, A. M. Parsons, J. Schweitzer, E. Amatucci, M. T. Smith, S. Floyd, T. P. McClanahan, "A Pulsed Neutron Gamma-Ray System for Mars Rover Missions", *IEEE 2005 Aerospace Conference Proceedings*, March 2005.

J. P. Holloway and H. Akkurt, "An Existence proof for a problem in prompt gamma neutron activation analysis", *Proceedings of American Nuclear Society Topical Meeting in Mathematics & Computations, Gatlinburg, TN*, 2003.

J. P. Holloway and H. Akkurt, "Some aspects of the mathematical modeling of prompt gamma neutron activation analysis," *Proceedings of PHYSOR 2000*, May 2000.

Conference Papers (Summaries & Abstracts)

H. Akkurt, K. B. Bekar, and K. F. Eckerman, "VOXMAT: Phantom Model with Combination of Voxel and Mathematical Geometry," submitted for presentation at the 53rd Annual Health Physics Society Meeting, July 13–17, 2008, Pittsburgh, PA.

H. Akkurt, K. B. Bekar, and K. F. Eckerman, "Development of Hybrid Computational Phantom for Radiation Dose Assessment," to be presented at the ICRS-11 & RPSD-2008, April 13–18, 2008, Pine Mountain, GA.

H. Akkurt, K. B. Bekar, and K. F. Eckerman, "Preliminary Results for VOXMAT: Phantom Model with Combination of Voxel and Mathematical Geometry," to be presented at the American Nuclear Society, 2008 Annual Meeting, June 8–12, 2008, Anaheim, CA.

H. Akkurt and K. F. Eckerman, "Estimation of Radiation Dose for a Sitting Phantom Using PIMAL," *Trans. Am. Nucl. Soc.* **97**, 458-460 (2007).

H. Akkurt and K. F. Eckerman, "Hybrid Computational Phantom VOXMAT: Combination of Voxel and Mathematical Representation of the Anatomy," presented at the 52nd HPS Annual Meeting, Portland, OR, July 8-12, 2007.

H. Akkurt, K. F. Eckerman, D. Wiarda, J. C. Wagner, and S. Sherbini, "Development of a Computational Phantom with Moving Arms and Legs for Radiation Dose Assessment," presented at the 52nd HPS Annual Meeting, Portland, OR, July 8-12, 2007.

H. Akkurt, K. F. Eckerman, J. C. Wagner, and S. Sherbini, "PIMAL: Computational Phantom with Moving Arms and Legs," *Trans. Am. Nucl. Soc.* **96**, 396-397 (2007).

H. Akkurt, D. Wiarda, A. M. Fleckenstein, and K. F. Eckerman, "A GUI for Computational Phantom with Freely Moving Arms and Legs," *Trans. Am. Nucl. Soc.* **96**, 640-641 (2007).

H. Akkurt and K. F. Eckerman, "VOXMAT: Hybrid Computational Phantom for Dose Assessment," *Trans. Am. Nucl. Soc.* **96**, 642-643 (2007).

R. D. Starr, L. G. Evans, A. M. Parsons, J. I. Trombka, J. Groves, **H. Akkurt**, S. R. Floyd, M. Namkung, L. Perkins, P. Wraight, and W. Ziegler, "Combined Gamma-Ray Spectrometer and Pulsed Neutron Generator System for In-Situ Planetary Geochemical Analysis," *Proceedings of the 38th Lunar and Planetary Science Conference*, League City, TX, March 12-16, 2007.

H. Akkurt, J. C. Wagner, K. Eckerman, "Hand Held Instruments for Landmine Detection: View from Radiation Dosimetry," presented at the 2006 Symposium on Radiation Measurements and Applications, Ann Arbor, MI, May 23-25, 2006.

H. Akkurt, "Benchmark Results for Monte Carlo Computations of Decay Time Measurements," *Trans. Am. Nucl. Soc.*, **91**, 117-119, 2004.

H. Akkurt and J. P. Holloway, "Sensitivity of the Fixed Point Formulation to Density for Large Sample PGNAA," *Trans. Am. Nucl. Soc.*, **90**, 367-369, 2004.

H. Akkurt and J. P. Holloway, "Sensitivity of the Fixed Point Iteration to Neutron Source Spectrum for Large Sample PGNAA," *Trans. Am. Nucl. Soc.*, **90**, 370-372, 2004.

H. Akkurt, J. P. Holloway, and L. E. Smith, "Testing the fixed point iteration for composition determination of large samples using PGNAA," *Trans. Am. Nucl. Soc.*, **86**, 388-389, 2002.

H. Akkurt, J. P. Holloway, and L. E. Smith, "A fixed point iteration for large sample prompt gamma analysis," *Trans. Am. Nucl. Soc.*, 85, 2001.

H. Akkurt and N. M. Abdurrahman, "Criticality benchmark calculations for multi-region (MOX and UO₂) slab core configurations," *Trans. Am. Nucl. Soc.*, **79**, 284, 1998.

H. Akkurt and N. M. Abdurrahman, "Benchmark calculations of ESADA multi-region MOX critical experiments," *Trans. Am. Nucl. Soc.*, **78**, 248, 1998.

N. M. Abdurrahman and H. Akkurt, "Criticality benchmark calculations of ESADA plutonium program with MCNP," *Trans. Am. Nucl. Soc.*, **77**, 368, 1997.

H. Akkurt, U. Colak, and C. N. Sokmen, "Dynamic Modeling of a PWR (*in Turkish*)," *Proceedings of the 7th National Congress on Nuclear Sciences and Technology*, Turkey, 1996.

Dissertation, Thesis, and Technical Reports

H. Akkurt and K. F. Eckerman, "Development of PIMAL: Mathematical Phantom with Moving Arms and legs," ORNL/TM-2007/14, Oak Ridge National Laboratory (May 2007).

H. Akkurt, "Composition Analysis of Large Samples with PGNAO Using a Fixed Point Iteration," *PhD Dissertation*, University of Michigan, 2002.

H. Akkurt, "MCNP Benchmark Calculations for Mixed Oxide Lattices of the ESADA Plutonium Program," MS Thesis, The University of Texas at Austin, August 1998.

H. Akkurt, "Development of a Control Model for a PWR," MS Thesis, Hacettepe University, Turkey, December 1996.

H. Akkurt and N. M. Abdurrahman, " Neutronics Benchmarks for the Utilization of Mixed-Oxide Fuel: Joint U.S./Russian Progress Report for Fiscal Year 1997, ESADA Plutonium Program Critical Experiments: Single-Region Core Configurations," ORNL/SUB/99-XSZ175V-1, Oak Ridge National Laboratory, 1999.

H. Akkurt and N.M. Abdurrahman, "Neutronics Benchmarks for the Utilization of Mixed-Oxide Fuel: Joint U.S./Russian Progress Report for Fiscal Year 1997, ESADA Plutonium Program Critical Experiments: Multi-Region Core Configurations," ORNL/SUB/00-XSZ175V-1, Oak Ridge National Laboratory, 2000.

H. Akkurt, N. M. Abdurrahman, R. T. Primm III, J. M. Barnes, and M. W. Yambert, "Neutronics Benchmarks for the Utilization of Mixed-Oxide Fuel: Joint U.S./Russian Progress Report for Fiscal Year 1997, ESADA Plutonium Program Critical Experiments: Power Distribution Measurements," ORNL/SUB/99-XSZ175V-5, Oak Ridge National Laboratory, 2001.

Computer Skills

- **Platforms and Operating Systems:** Windows 95/NT, UNIX, Linux.
- **General Purpose Software Packages:** LaTeX, Microsoft Office (Word, Excel, Power Point, Paint), Sigma Plot, Xfig, and Gnu Plot.
- **Programming Languages:** FORTRAN (Experienced), MATLAB (Experienced), HTML, and Java Script (Working knowledge).
- **Nuclear Engineering Computer Codes:** MCNP, McBend, DANTSYS, CSAS1X module of SCALE, NJOY, and TRANSX.

Awards and Activities

- Nuclear Science and Technology Division Scientific and Technical Award (December 2006)
- Elected to Board, ANS Oak Ridge/Knoxville Local Section (2007-present); Program Chair (2006-2007)
- Rackham Recruitment Fellowship, University of Michigan (September 1999-August 2000)
- Member, American Nuclear Society
- Member, Sigma Xi
- Member, IEEE
- Member, HPS
- Reviewer, Applied Radiation and Isotopes
- Reviewer, Nuclear Instruments and Methods in Physics Research-A
- Reviewer, Radiation Protection and Shielding Conference 2006