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EDUCATION

PhD	**The Pennsylvania State University, PA** **Dissertation:** Modular Optimization Code Package: MOZAIK **(GPA 3.95/4.00)**	2008
M.S.	**Hacettepe University, Nuclear Engineering Department, Ankara, Turkey** **Thesis:** Performance Evaluation of Parallel Monte Carlo Methods with Variance Reduction Techniques **(GPA 4.00/4.00)**	1999
B.S.	**Hacettepe University, Nuclear Engineering Department, Ankara, Turkey (GPA 3.31/4.00)**	1996

EXPERIENCE

2010-present **Research and Development Staff,**
Oak Ridge National Laboratory, Radiation Transport Group, Oak Ridge, TN

- **Develop computational methods, algorithms, and parallel application codes for SCALE: software packages for nuclear licensing and safety analysis**.
  - Principal developer for the following codes:
    - Parallel KENOVI/KENOVa,
    - Parallel Sampler,
    - Parallel XSProc, code development,
    - Parallel Runner,
    - CE-TRITON
  - Working on several SCALE projects as a member of SCALE Monte Carlo code development, and SCALE modernization teams.
- **Shielding design analysis for SNS beam line, USANS**
  - Developed computational models for USANS beam lines for shielding analyses,
  - Support USANS shielding design.
- **Shielding design analysis for High Power Target Laboratory (HPTL),**
  - Estimated the dose rates near/around the shielding enclosure for HPTL using traditional and advanced computational tools (Denovo, ADVANTG, MCNPX).

2008 – 2010 **Post Doctoral Research Associate**
Oak Ridge National Laboratory, Radiation Transport Group, Oak Ridge, TN

- **Shielding design analysis for SNS beam lines, NOMAD and USANS**. The task involves developing computational models (MCNPX) for two beam lines, and using the developed models to compute the radiation dose rates; and evaluation of the shielding requirements for the protection of surrounding zones.
- **MCNP-BRL, a linkage between the MCNP and CAD geometry.** Improved the defined geometry interface module between MCNP5 and the CAD package, BRL-CAD (Army Research Laboratory's CAD software). Designed many benchmark cases to extensively test robustness and performance of MCNP-BRL. Developed MCNP like error-handling mechanisms for MCNP-BRL to reduce user errors. In

addition to BRL-CAD, the final product is capable to use the geometry defined in some other CAD formats (Pro/E, ACAD, IGES, STF, etc).

- **Worked on Computational Dosimetry Project.** The task involves developing the VOXMAT computational phantom (a phantom model defined with the combination of voxelized geometry and stylistics geometry) models for male and female radiation workers.
- **Provided "a reference solution set" for NEA Benchmark**, "Suite of Benchmarks for 3D Transport Methods and Codes over a Range in Parameter Space" using ORNL's ADVANTG/MCNP code system.

2004 – 2008 **Research Assistant**
Mechanical and Nuclear Engineering Department, PSU, University Park, PA

- **PhD dissertation title:** Modular Optimization Code Package: MOZAIK
  Advisor: Dr Y. Y. Azmy.
  A modular optimization code package was developed for geometric optimization problems in the nuclear related applications. The code's performance and its modular structure were tested with the Penn State Breazeale Reactor's existing beam tube configuration, then the optimal shape of the moderator tank shape was sought for different new beam tube arrangements.
- **Computed the MCNP reference solutions and the TORT contributed solutions** for the NEA Benchmark, "Suite of Benchmarks for 3D Transport Methods and Codes over a Range in Parameter Space".

1996 – 2004 **Research and Teaching Assistant**
Nuclear Engineering Department, Hacettepe University, Ankara, TURKEY

- **MS thesis title:** Performance Evaluation of Parallel Monte Carlo Method with Variance Reduction Techniques.
  Advisor: Dr M. Tombakoglu.
  A parallel Monte Carlo code was developed for one-dimensional slab geometry. The code was parallelized using direct parallelism and domain decomposition strategies via Parallel Virtual Machine (PVM). Different variance reduction techniques were implemented in the code and their performance with the two parallelization strategies, and different problem parameters was examined.
- **Conducted research on the following projects:**
  - "Simulation of Radiation Detection Systems and Trace Element Analysis Using Monte Carlo Methods", 2003. Developed computational model and performed first principal calculations.
  - "Analysis of Radiation Shielding Characteristics of Barite Concrete", 2001, supported by ADO Ltd. Sti., Turkey. Designed the experimental setup and developed computational model, and analyzed the results.
  - "Multi Purpose Parallel Computer System (CAPBS)", 2001, supported by Hacettepe University Research Fund, Turkey. Designed and managed a parallel computer system (1 main node, 20 computation nodes, 1 backup server, 1 file server).
  - "Local Area Parallel Computer System (YAPBS)", 1998, supported by Hacettepe University Research Fund. Developed several computer codes to test the performance of the YAPBS.
  - "Development of Data Transfer, Processing and Control Units for the Radiation Measurement System", 1998, supported by Hacettepe University Research Fund. Turkey. Developed hardware and software interface between the control unit and a PC.
- **Instructor for** Introduction to Programming and Programming-I for undergraduate courses, and Nuclear Physics Laboratory for undergraduate students.
- **Assisted in teaching** Reactor Physics; Nuclear Reactor Engineering; Nuclear Design Project; Numerical Analysis courses. Duties included preparation of the outline for the experiments, assigning homework, preparation and grading of homework and quizzes, and evaluation of projects.

- **Administrator of the department's computer system and Beowulf cluster.**

July – Aug 2007 (5 weeks)	**Summer intern, Oak Ridge National Laboratory (Mentor: Dr. Hatice Akkurt)** Developed a simple version of hybrid computational phantom using a combination of voxel and mathematical geometry.
Apr – July 2007 (13 weeks)	**Summer intern, Oak Ridge National Laboratory (Mentor: Dr. Hatice Akkurt)** Involved in the development of algorithms for heterogeneous layering problem. Performed Monte Carlo computations for the forward problem and tested the algorithm.
May-July 2006 (10 weeks)	**Summer intern, Oak Ridge National Laboratory (Mentor: Dr. Sara Pozzi)** Developed a high performance post-processing algorithm for the MCNP-Polimi code used in the fields of nuclear nonproliferation and nuclear safeguards.
May-July 2005 (10 weeks)	**Summer intern, Oak Ridge National Laboratory (Mentor: Dr. Sedat Goluoglu)** Developed a memory management module for the particle transport code, TORT, to make it use the computer resources more efficiently.
Apr 2000 (10 days)	**Trained for Performance Tuning on High Performance Computers, SUN Micro-systems, Istanbul, TURKEY** Participated in the activities of the high performance group.
July-Aug 1994 (4 weeks)	**Summer Training , Turkish Atomic Energy Authority, Cekmece Nuclear Research and Training Center** Participated in activities of the nuclear reactor control and nuclear core design groups, performed core design and analysis calculations.
July-Aug 1993 (4 weeks)	**Summer Training, Soma Coal Power Plant, Manisa, Turkey** Participated in activities of the plant's control and maintenance groups.

COMPUTER SKILLS

Programming Languages	➢ Fortran, C, C++, HPF, Basic, Pascal, Java (advanced) ➢ Script languages: Tcl/TK, perl, python, awk, bash programming (advanced)
Parallel Computing	➢ Parallel programming system and libraries, MPI, PVM and OpenMP (advanced)
Operating Systems and Application Programs	➢ POSIX standard systems (UNIX, Linux, Darwin) (advanced user and developer) ➢ Windows 98/XP/7/8 (good) ➢ BLAS, LAPACK, ATLAS, HDF, LaTeX, Maple, Matlab, Mathematica, VisIt, MORITZ, and BRLCAD (advanced) ➢ MS-Office applications, SNNS-neural network package (good)
Nuclear Code Systems	➢ DOORS, BOT3P, MCNP/MCNPX, EGS4, DENOVO, ADVANTG, SCALE, RELAP, CITATION, WIMS, COBRA ➢ VSOP (basic user)

PUBLICATIONS

1. S. Goluoglu, K. B. Bekar, and D. Wiarda, *"SCALE Continuous-Energy Monte Carlo Depletion with Parallel KENO in TRITON,"* Trans. Am. Nucl. Soc. **106**, 723-725 (2012).
2. I. Remec and K. B. Bekar, *"Shielding Design for the SNS Dual Beamline Serving USANS and NOMAD Instruments,"* Proc. of the Tenth International Topical Meeting on Nuclear Applications of Accelerators (AccApp11), Knoxville, Tenn., April 3-7, (2011).
3. I. Remec and K. B. Bekar, "*SNS Beamline Shielding Design Challenges: Neutron Beamline 1 Example,*" American Nuclear Society Radiation Protection and Shielding Division 2010 Topical Meeting, Las Vegas, Nev., April 18-23, (2010).
4. H. Akkurt**,** K. B. Bekar, and K. F. Eckerman, *"Estimation of Patient and Physician Doses in Interventional Cardiology Using ICRP Male Phantom and Hybrid Phantom VOXMAT,"* American Nuclear Society Radiation Protection and Shielding Division 2010 Topical Meeting, Las Vegas, Nev., April 18-23, (2010).
5. K. B. Bekar, J. C. Wagner, and T. M. Evans, "*Testing MCNP-BRL for Nuclear Vulnerability Assessment with the M60A1 Tank*," American Nuclear Society Radiation Protection and Shielding Division 2010 Topical Meeting, Las Vegas, Nev., April 18-23, (2010).
6. K. Bekar and T. M. Evans, *"MCNP-BRL: A Linkage between MCNP and CAD Geometry,"* Trans. Am. Nucl. Soc. **101**, 623-626 (2009).
7. Akkurt H., Bekar K.B. and Eckerman K.F., "*Assessment of Organ Doses for a Glovebox Worker Using Realistic Postures with PIMAL and VOXMAT",* Trans. Am. Nucl. Soc. **101**, 671-673 (2009).
8. Bekar K.B. and Azmy. Y. Y., *"Revisiting the TORT Solutions to the NEA Suite of Benchmarks for 3D Transport Methods and Codes over a Range in Parameter Space,"* Proceedings of the 2009 International Conference on Advances in Mathematics, Computational Methods, and Reactor Physics (M&C 2009), Saratoga Springs, NY, May 3-7, 2009, on CD-ROM, American Nuclear Society, LaGrange Park, IL (2009).
9. Bekar K.B., Azmy Y.Y., Unlu K. and Brenizer J., *"A Case Study to Test MOZAIK for Different Optimization Problems,"* Proceedings of the 2009 International Conference on Advances in Mathematics, Computational Methods, and Reactor Physics (M&C 2009), Saratoga Springs, NY, May 3-7, 2009, on CD-ROM, American Nuclear Society, LaGrange Park, IL (2009).
10. Bekar K.B. and Azmy Y.Y., *TORT Solutions to the NEA Suite of Benchmarks for 3D Transport Codes and Methods over a Range in Parameter Space,* Annals of Nuclear Energy, Vol. 36, Issue 3, pp. 368-374, (2009).
11. Bekar K.B., Azmy Y.Y., Unlu K., Brenizer J. *"Performance Evaluation of MOZAIK for PSBR's Beam Port Design Calculations",* submitted for presentation at PHYSOR-2008, International Conference on Reactor Physics, Nuclear Power: A Sustainable Resource Casino-Kursaal Conference Center, Interlaken, Switzerland, September 14-19, (2008).
12. Bekar K.B., Azmy Y.Y. *"TORT Solutions to the NEA Suite of Benchmarks for 3D Transport Methods and Codes over a Range in Parameter Space",* submitted for presentation at PHYSOR-2008, International Conference on Reactor Physics, Nuclear Power: A Sustainable Resource Casino-Kursaal Conference Center, Interlaken, Switzerland, September 14-19, (2008).
13. Bekar K. B., "Modular Optimization Code Package: MOZAIK", PhD. Thesis, Penn State University, USA, (2008).
14. Akkurt H., Bekar K.B., Eckerman K.F., *"Preliminary Results for VOXMAT: Phantom Model with Combination of Voxel and Mathematical Geometry",* Trans. Am. Nucl. Soc., **98**, 475-476, (2008).
15. Akkurt H., Bekar K.B., Eckerman K.F., *"VOXMAT: Phantom Model with Combination of Voxel and Mathematical Geometry",* HPS 53rd Annual Meeting, Pittsburgh, PA, July 13-17, (2008).
16. Akkurt H., Bekar K.B., Eckerman K.F., *"Development of Hybrid Computational Phantom for Radiation Dose Assessment",* RPSD-2008, 15th Topical Meeting of the Radiation Protection and Shielding of the ANS, Pine Mountain, GA, April 13-15, (2008).
17. Alim F., Bekar K., Ivanov K., Unlu K., Brenizer J. and Azmy Y., *"Modeling and optimization of existing beam port facility of PSBR"*, Annals of Nuclear Energy, Vol. 33, Issues 17-18, Pages 1391-1395, November-December, (2006).
18. Pozzi S. and Bekar K.B., *"Analysis of Time Correlation Measurements with the Active Well Coincidence Counter"*, Symposium on International Safeguards: Addressing Verification Challenges, Vienna, Austria, October 16-20, (2006).
19. Bekar K.B., Azmy Y.Y., Unlu K., Brenizer J. *"A Case Study to Bound the Search Space of the Optimization Problem for the PSBR Beam Tube"*, PHYSOR-2006, American Nuclear Society's

Topical Meeting on Reactor Physics. Vancouver, BC, Canada, September 10-14, (2006).

20. Bekar K.B., Azmy Y.Y., Unlu K., *"Testing Optimization Sequence For The Beam Port Facility of PSBR"*, International Topical Meeting on Mathematics and Computation, Supercomputing, Reactor Physics and Nuclear and Biological Applications, Avignon, France, Sept. 12-15, 2005, on CD-ROM, American Nuclear Society, La Grange Park, IL, (2005).
21. Bekar K.B., Azmy Y.Y., Unlu K., "*TORT Modeling of the Beam Port Facility of PSBR and Comparison with MCNP"*, Transactions of the American Nuclear Society, 92, 151 (2005). [Invited]
22. Tombakoglu M., Bekar K.B., Erdemli O.A., "*Performance Evaluation of Genetic Algorithms on Loading Pattern Optimization of PWRs*", International Conference, Nuclear Energy in Central Europe 2001, Ljubljana-Slovenia, September 10-13, (2001).
23. Bekar K.B., Tombakoglu M., Sokmen C. N., *"Simulation of Neutron Transport Equation Using Parallel Monte Carlo for Deep Penetration Problems"*, I. Eurasia Conference on Nuclear Science and Its Application, Izmir, Turkey, October 23-27, (2000).
24. Yilmazbayhan A., Tombakoglu M., Bekar K.B., Erdemli O.A., "*Genetic Algorithms in Loading Pattern Optimization*", I. Eurasia Conference on Nuclear Science and Its Application, Izmir, Turkey, October 23-27, (2000).
25. Bekar K. B., "*Performance Evaluation of Parallel Monte Carlo Method with Variance Reduction Techniques."* M.S. Thesis, Hacettepe University, Turkey, (1999).

PROFESSIONAL AFFILIATIONS AND MEMBERSHIPS

Oct 2005-present	American Nuclear Society (ANS), member.
July 1996- present	Turkish Nuclear Engineers Society, member.

COMMUNITY ACTIVITIES and HOBBIES

1996-1997	Participated in a public enlightenment project dedicated to change the public misconception and prejudice against the first Turkish nuclear power plant
March 1999	Participated as a speaker in a nationwide TV panel "Nuclear Energy, its Peaceful Use and Public Perception" with opponents of nuclear energy
Hobbies:	Outdoor activities, fishing, playing soccer, and cooking.

REFERENCES

Available upon request