Robert E. Grove

EDUCATION

1996 Ph.D. in Nuclear Engineering, The University of Michigan, Ann Arbor, Michigan.
Dissertation: "A Characteristic-Based Multiple Balance Approach for Solving the S_N Equations on Arbitrary Polygonal Meshes."

1984 M.S. in Nuclear Engineering, The Pennsylvania State University, University Park, Pennsylvania.
Thesis: "A Comparative Study of the Loevinger and Uniform Concentration Dose Models Applied to Airborne Beta Emitters."

1982 B.S. in Nuclear Engineering, The Pennsylvania State University, University Park, Pennsylvania.

PROFESSIONAL EXPERIENCE

2010-Present *Group Leader, Radiation Transport; UT-Battelle; Oak Ridge National Laboratory; Oak Ridge, TN.* Responsible for managing and contributing with a group of 18 technical research and development staff supporting all aspects of radiation transport methods development and applications. Also hold a Joint Faculty Appointment with the University of Tennessee Department of Nuclear Engineering.

1996-2010 *Senior Physicist / Nuclear Design Methods; KAPL, Inc. – A Lockheed Martin Co.; Knolls Atomic Power Laboratory; Schenectady, NY.* Responsible for all aspects of advanced deterministic transport methods development. Technical lead for developing general-geometry deterministic transport tools for reactor physics and shielding applications. Laboratory advisor for two NNPP Fellows; mentor for new methods developer(s). Recruiter for Lockheed Martin and KAPL, concentrating on methods development graduate students.

1992-1996 *Senior Engineer / Reactor, Criticality, and Shielding Methods; Westinghouse Savannah River Co.; Savannah River Laboratory; Aiken, SC.* Responsible for methods development and technical reviews for heavy-water material-production reactor core, criticality, and shielding design/analysis applications. Developed and implemented a new deterministic transport method. Worked on a team to assess and modernize legacy reactor physics codes. Resolved long-standing calculated-to-measured axial flux differences for SRS assemblies.

1988-1992 *Graduate Research Assistant / Nuclear Engineering; The University of Michigan; Ann Arbor, MI.* Participated with faculty and students in an extensive USDOE-funded research project to examine an advanced converter reactor design utilizing a spectral shift control concept. Oversaw graduate student work on research team. Responsible for preliminary assembly-level nuclear design.

1984-1988 *Senior Engineer / Reactor Core Design; E.I. DuPont de Nemours and Co., Inc.; The Savannah River Plant; Aiken, SC.* Responsible for nuclear and thermal-hydraulic heavy-water material-production reactor core designs, surveillance/assessment of operating cores, and core design quality verification reviews. Developed physics core design computer code users' manual and provided technical training.

Engineer-A / Reactor Physicist. Responsible for daily on-location technical assistance on operational reactor physics and engineering for a production reactor. Performed reactor physics and engineering calculations, technical and operational surveillance, and procedure compliance auditing.

Engineer / Nuclear Engineering. Responsible for providing nuclear engineering services for ex-core applications. Initiated project to develop a monitoring system for low tritium levels mixed with noble gases in stack effluents. Performed acceptance/calibration testing of fission chambers for an in-core charge and discharge monitoring system. Developed conceptual system design to improve routine and emergency monitoring of production reactor stack effluents.

1982-1984 *Graduate Research Assistant / Nuclear Engineering; The Pennsylvania State University; University Park, PA.* Developed an improved dose estimator for airborne beta emitters; a USDOE-funded research project in nuclear waste management.

1981 *Summer Technical Intern; US Nuclear Regulatory Commission; Materials Certification Branch; Silver Spring, MD.* Developed a pilot management information system including programs to indicate trends in material licenses along with an interactive system to facilitate licensee contact and information retrieval.

PROFESSIONAL SERVICE

Organisation for Economic Cooperative Development Nuclear Energy Agency – Working Party on Scientific Issues of Reactor Systems

Chair: Expert Group on Radiation Transport and Shielding 2011, 2012

American Nuclear Society

Technical Program Chair: Mathematics & Computations Division Topical Meeting 2009.
Executive Committee: Mathematics & Computations Division: 2000, 2001, 2002.
Technical Program Committee:
Mathematics & Computations Division Topical Meeting 1997;
Reactor Physics Topical Meeting 2000.
Organized Special Sessions: Mathematics & Computations Division Topical Meeting 1997.
Chaired Technical Sessions:
Mathematics & Computations Division Topical Meeting 1997;
ANS National (Winter) Meetings.
Participant:
Mathematics & Computations Division Topical Meetings 1991, 1995, 1997, 2001, 2003, 2005, 2007, 2009;
Reactor Physics Topical Meetings 1992, 2000, 2004;
Radiation Protection and Shielding Division Topical Meetings 1994, 1998, 2002, 2004, 2008, 2010;
ANS National (Winter) Meetings 1993, 1994, 1995, 1996, 1998, 1999, 2001, 2003, 2004, 2007, 2009, 2011.
Member: ANS, Mathematics & Computations Division, Reactor Physics Div., Radiation Protection and Shielding Div.
President, Penn State ANS Student Chapter, 1981-1982.

PUBLICATIONS

J. J. Jarrell, R. E. Grove, and T. M. Evans, "A Cut-Cell Approach for 2D Cartesian Meshes that Preserves Orthogonal Grid Sweep Ordering," *Trans. Am. Nuc. Soc.*, **105**, pp 435-437 (November 2011).

B. L. Kirk, R. E. Grove, I. Kodeli, E. Sartori, and J. Gulliford, "Shielding Integral Benchmark Archive and Database (SINBAD)," *Proceedings of the 14th International Symposium on Reactor Dosimetry (ISRD-14)*, Bretton Woods, NH, May 22-27, 2011.

R.A. Kennedy, A.M. Watson, and R.E. Grove, "Linear Discontinuous (LD) Coefficients in the Slice Balance Approach (SBA) Mathematical Framework for the Discrete Ordinates Code Jaguar," *PHYSOR 2010 – Advances in Reactor Physics to Power the Nuclear Renaissance*, Pittsburgh, PA, May 9-14, 2010, on CD-ROM, American Nuclear Society, LaGrange Park, IL (2010).

R.E. Grove and M.T. Shearer, "Surface Mesh Refinement with the Slice Balance Approach (SBA)," *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).

A.M. Watson, R.E. Grove and M.T. Shearer, "Effective Software Design for a Deterministic Transport System," *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).

J.J. Jarrell, R.E. Grove, M.T. Shearer, and A.M. Watson, "Discrete Ordinate Mapping Algorithm for Region-Based Quadrature Sets," *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).

R.E. Grove, A.M. Watson and M.T. Shearer, "A Diamond-Difference-Like SBA Scheme (SBA-DDL) for Polyhedral Meshes," *Trans. Am. Nuc. Soc.*, **97**, pp 479-481 (November 2007).

A.M. Watson, R. E. Grove and M.T. Shearer, "The Effectiveness of Krylov Methods Applied to SBA," *Trans. Am. Nuc. Soc.*, **97**, pp 482-484 (November 2007).

R.E. Grove, "The Slice Balance Approach (SBA): A Characteristic-Based, Multiple Balance S_N Approach on Unstructured Polyhedral Meshes," *Proc. Mathematics and Computation, Supercomputing, Reactor Physics and Nuclear and Biological Applications*, Palais des Papes, Avignon, France, September 12-15 (2005). CDROM.

R.E. Grove and R.E. Pevey, "A Characteristic Based Multiple Balance Approach for S_N on Arbitrary Polygonal Meshes," *Proc. Int. Conf. Mathematics and Computations, Reactor Physics, and Environmental Analyses*, Portland, OR, April 30 – May 4, Vol. 2., p. 928 (1995).

R.E. Grove, "Axial Distribution of Fuel and Target Materials in SRS Mark 22 Assemblies," *Trans. Am. Nucl. Soc.*, **69**, 477 (1993).

R.E. Grove, W.R. Martin, J.C. Lee, A. Oukebdane and P.M. Keller, "Preliminary Design and Analysis of a Slightly-Enriched Spectral Shift Reactor," *Proc. Int. Conf. Physics of Reactors,* 1, I-34, Marseille, France (1990).

J.C. Lee, W.R. Martin, M.C. Edlund, R.E. Grove, P.M. Keller, A. Oukebdane, J. Vujic and A. Majumdar, "Improved Fuel Utilization with a Slightly-Enriched Spectral Shift Reactor," *IAEA Technical Committee on Technical and Economic Aspects of High Converters,* Carlton Hotel, Nuremburg, FRG, 26-29 March 1990.

R.E. Grove, J.C. Lee, W.R. Martin and M. C. Edlund, "Preliminary Design of a Slightly Enriched Spectral Shift Reactor," *Trans. Am. Nucl. Soc.,* **60**, 634 (1989).

Other Invited Presentations

"New Particle Transport Methods Development at KAPL," Nuclear Engineering Departmental Seminars:
Texas A&M University, College Station, TX, September (2007).
The University of Michigan, Ann Arbor, MI, December (2006).
The Pennsylvania State University, University Park, PA, October (2006).

"Introduction to Deterministic Methods for Neutral Particle Transport Problems," Seminar to ANS Student Section, Rensselaer Polytechnic Institute, Troy, NY, May (2007).

"S_N on Unstructured Meshes using the Slice Balance Approach (SBA)," *Spring 2005 Workshop on Parallel Transport,* Texas A&M University, College Station, TX, May (2005).

"The Slice Balance Approach (SBA): A Characteristic-Based Multiple Balance S_N Approach on Unstructured Polyhedral Meshes," *Ed Larsen: Gentleman, Unsurpassed Asymptoticist, Professor, Orator,* A Conference to Honor Professor Ed Larsen, Ann Arbor, MI, November (2004).

"I.K. Abu-Shumays: A Colleague, Mentor and Friend," invited remarks at luncheon to honor I.K. Abu-Shumays, *International Conf. on Nuclear Mathematical and Computational Sciences,* Gatlinburg, TN, April 6-10 (2003).

PhD Dissertation

R.E. Grove, "A Characteristic-Based Multiple Balance Approach for Solving the S_N Equations on Arbitrary Polygonal Meshes," The University of Michigan (1996). Academic advisors: Edward W. Larsen and William R. Martin.

MS Thesis

R.E. Grove, "A Comparative Study of the Loevinger and Uniform Concentration Dose Models Applied to Airborne Beta Emitters," The Pennsylvania State University (1984). Academic advisor: Ward T. Diethorn.

Other Technical Reports and Presentations

The conference papers and summaries above were presented in the indicated meetings or conferences. Additionally, in industrial experience, five to fifteen major technical presentations per year were made to various levels of management and technical staff and numerous technical reports were published internally. Also, recruiting presentations were made at several universities and career fairs in addition to student interviews.

GRADUATE STUDENTS SUPERVISED

2006-2010 Naval Nuclear Propulsion Program laboratory advisor and dissertation committee member for:
Joshua Jarrell, Admiral Hyman Rickover Fellow,
Texas A&M University, academic advisor: Marvin L. Adams.
Dissertation: "An Adaptive Angular Discretization for Neutral Particle Transport in Three-Dimensional Geometries," July 2010.

2005-2009 Naval Nuclear Propulsion Program laboratory advisor and dissertation committee member for:
Daniel F. Gill, Admiral Hyman Rickover Fellow,
The Pennsylvania State University, academic advisor: Yousry Y. Azmy.
Dissertation: "Newton-Krylov Methods for the Solution of the k-Eigenvalue Problem in Multigroup Neutronics Calculations," December 2009.

2003-2009 Naval Nuclear Propulsion Program laboratory advisor and dissertation committee member for:
Troy L. Becker, Admiral Hyman Rickover Fellow,
The University of Michigan, academic advisor: Edward W. Larsen.
Dissertation: "Hybrid Monte Carlo/Deterministic Methods for Radiation Shielding Problems," December 2009.

2005 Oversaw contract work performed by Phoungloan T. Libby, North Carolina State University, Department of Nuclear Engineering.

2003 Supervised summer technical intern Peter J. Yarsky, Massachusetts Institute of Technology.

MENTORING

2005-2010	Mentored Aaron Watson who joined the KAPL Advanced Deterministic Transport development team in August, 2005.
1996-pres.	Mentored new and existing transport methods developers, practitioners, and undergraduate/graduate student interns in KAPL Reactor Physics and Shielding communities.
1992-1996	Mentored new and existing methods developers in WSRC Reactor, Criticality and Shielding Methods at the Savannah River Laboratory.
1984-1988	Mentored new and existing reactor core designers and operating reactor physicists in E.I. DuPont de Nemours and Co., Inc. Reactor Technology Department at The Savannah River Plant.