Bruce Wayne Patton

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WORK EXPERIENCE

Oak Ridge National Laboratory: May 2005 - Present
Oak Ridge, TN
R&D Staff Member
I conduct computational analysis of nuclear criticality experiments and radiation shielding using large scale Monte Carlo simulation codes. Current and past projects include numerical simulation of gamma and neutron radiation detectors for the DHS, DoD, and DOE national security programs, and criticality safety of fuel transport casks. These projects often include comparison of simulations to experimental data and to design of new experimental facilities and concepts.

I often perform my analysis on large multi-processor parallel machines using either MPI or OPEN-MP, and I have extensive experience in the Fortran-77, Fortran-90, C, and the Perl programming languages. I currently hold a DOE Q clearance.

NASA - Marshall Space Flight Center: May 1999 – May 2005
Huntsville, AL
AST - Electric Propulsion
I analyzed the performance of advanced nuclear propulsion systems, working extensively with the Advanced Concepts Group in the Engineering Directorate. As such, I performed high level system feasibility studies on nuclear power reactors nuclear reactors utilizing Brayton, liquid metal Rankine, and MHD power conversion cycles. I often participated as a member of an integrated vehicle design team for inter-planetary missions. I conducted computational fluid dynamics and heat transfer simulations of engineering systems, and performed radiation transport and shielding calculations for fission, fusion and advanced high energy concepts. Another project was a joint effort between MSFC, ORNL, and AEDC on the applications of genetic algorithms to the optimization of in-space nuclear electric propulsion systems.

I was the contracting official technical representative (COTR) on Phase I/II SBIR awards, for which I performed technical evaluations of new SBIR proposals and served as technical monitor in tracking budgets and contractor performance. I also was the UNIX system administrator for various workstations (IBM RS/6000, Sun Ultra, and DEC Alpha) in our group, with responsibilities for installation of new software, system and security upgrades, and advice on numerical simulations. I held a DOD Top-Secret clearance while at MSFC.

Westinghouse Safety Management Solutions, Inc: May 1998 – May 1999
Aiken, SC
Senior Engineer, Radiation Transport & Criticality
I performed numerical calculations in radiation shielding analysis and criticality safety, using the SCALE shielding and criticality package and MCNP radiation transport code to nuclear criticality safety evaluations and radiation shielding design and safety analysis problems. I conducted safety assessments of various nuclear facilities and equipment to ensure compliance with DOE regulations.

WORK EXPERIENCE (contd)

Los Alamos National Laboratory: October 1996 – April 1998
Los Alamos, NM
Postdoctoral Research Assistant
I was a postdoctoral assistant with the Spallation Physics Team of the Los Alamos high energy particle accelerator facility. I performed design and analysis of accelerator based neutron spallation target systems and engineering components, preliminary design studies of a medical isotope production facility, and of a new neutron scattering instruments. I am experienced in the application of the Monte Carlo radiation transport codes MCNP and MCNPX to the design of spallation neutron targets and high energy accelerator shielding.

University of Michigan: October 1991 – September 1996
Ann Arbor, MI
Graduate Student
My graduate research was in the development of advanced linear algebra numerical methods for the solution of the particle transport equation. My thesis topic was the application of preconditioned Krylov subspace iterative techniques, in particular the Generalized Minimial Residual Method (GMRES), to the solution of the neutron transport equation. I also was a teaching assistant for undergraduate engineering dynamics and statics courses in the Mechanical Engineering department, and a reactor analysis course in Nuclear Engineering.

Oak Ridge National Laboratory: June 1986 – August 1991
Oak Ridge, TN
Development Associate III
Job Description:
I performed heat transfer and neutronic design studies of experimental capsules for irradiation in the High Flux Isotope Reactor. These experiments contained either nuclear fuels or structural materials, and were designed to operate at specific temperatures. My responsibilities included ordering materials, quality assurance specifications, performing safety analysis, and supervising technicians in the construction of the experiments.
I also performed large scale computational analysis with the MELCOR severe accident reactor analysis code for the Nuclear Regulatory Commission studies on light water reactors.

United States Navy: August 1978 – December 1983
Norfolk, VA
Naval Officer, LT
I served as Reactor Mechanical Division officer on board the USS Virginia (CGN-38). My duties included maintaining technical proficiency and qualifications as a reactor operations supervisor, resolving personnel issues, annual performance evaluation, and training of approximately 45 enlisted personnel. I planned work schedules and budgets for extended ship deployments and maintenance of the ship's propulsion equipment.

I qualified as engineering supervisor of operations of the pressurized light water nuclear reactors and associated subsystems. I have four years of operational experience with naval nuclear reactors and their associated steam plant mechanical equipment and electrical distribution systems.

EDUCATION

University of Michigan
Ann Arbor, MI
Doctorate - 12/1996
70 Semester Hours
Major: Nuclear Engineering
GPA: 3.45 out of 4.0

EDUCATION (contd)

Relevant Coursework, Licensures and Certifications:
Nuclear Reactor Physics - 6 semester hours
Computational Fluid Dynamics - 6 semester hours
Gas Kinetic Theory - 3 semester hours
Fluid Flow - 3 semester hours
Numerical Methods in Chemical Engineering - 3 semester hours
Neutron Transport Theory - 3 semester hours
Reactor Kinetics and Control - 3 semester hours
Fluid Flow - 3 semester hours
Reactor Engineering and Design - 6 semester hours

University of Alabama - Huntsville
Huntsville, AL
45 Semester Hours
Major: Electrical Engineering
GPA: 3.85 out of 4.0
Relevant Coursework, Licensures and Certifications:
Electro magnetic Theory, 9 semester hours
Electromagnet Waves, 3 semester hours
Random Noise and Signal Analysis, 3 semester hours
Communication Theory, 3 semester hours
Magneto-gas dynamics, 3 semester hours
Numerical Methods of MHD, 3 semester hours
Computational Fluid Dynamics, 6 semester hours

Georgia Institute of Technology
Atlanta, GA
Master's Degree - 6/1986
36 Semester Hours
Major: Nuclear Engineering
GPA: 3.67 out of 4.0
Relevant Coursework, Licensures and Certifications:
Reactor Engineering - 6 semester hours
Radiation Detection and Measurement - 3 semester hours
Reactor Kinetics and Control - 3 semester hours
Heat Transfer - 3 semester hours
Fluid Flow I - 3 semester hours
Reactor Laboratory & Measurements - 3 semester hours
Variational Methods in Engineering - 6 semester hours

Louisiana Tech University
Ruston, LA
Bachelor's Degree - 5/1979
130 Semester Hours
Major: Physics
Minor: Math
GPA: 3.54 out of 4.0
Relevant Coursework, Licensures and Certifications:
Electromagnetic Theory - 6 semester hours
Classical Mechanics - 3 semester hours
Circuit Analysis - 3 semester hours
Static's and Dynamics - 3 semester hours

EDUCATION (contd)

Thermodynamics - 3 semester hours
Modern Physics - 6 semester hours
Finite Elements - 3 semester hours
Electronics - 3 semester hours
Advanced Engineering Mathematics - 6 semester hours
Numerical Analysis - 3 semester hours

JOB-RELATED TRAINING

Criticality Calculations with MCNP, 1 week, 2002
CFD-ACE Introductory Training Course, 1 week, 2001
NASA COTR Training, 1 week, 2000
AIAA short course on Electric Propulsion, 1 week, 2000
Navy Nuclear Power School, 6 months, 1980
Naval Prototype Training School, 6 months, 1980
Naval Surface Warfare Officer Training School, 6 months, 1981

AFFILIATIONS

American Nuclear Society Member
IEEE Member

PROFESSIONAL PUBLICATIONS

B. W. Patton and K. Sorensen, "Application of Molten Salt Reactor Technology to Multi-Megawatt In-Space NEP and Surface Power Missions," American Nuclear Society Conference, ICAPP Embedded Topical Meeting, Hollywood, FL, June 13-17, 2002.

J. Blevins, B. W. Patton, N. Rhys, and G. Schmidt, "Limitations of Nuclear Propulsion for Earth to Orbit," 37th AIAA/ASME/SAE/ASEE Joint Propulsion Conference, Salt Lake City, UT, July 8-11, 2001.

B. W. Patton and J. P. Holloway, "Application of GMRES to the Numerical Solution of the Neutron Transport Equation," *Annals of Nuclear Energy*.

B. W. Patton and G. J. Russell, "Heat Load Estimates for an Internal Liquid Helium UCN Source at a Long Pulsed Spallation Source," 1998 ANS Radiation & Shielding Division Topical Conference, pp. 79-83, Nashville, TN, April 18-23, 1998.

B. W. Patton, G. J. Russell, et al., "Benchmarking of the Fertile to Fissile Conversion (FERFICON) Experiments: Integral n/p Measurements," 1997 ANS Winter Meeting, Nuclear Applications of Accelerator Technology Topical Meeting, Albuquerque, NM.

B. Guthrie, J. P. Holloway, and B.W. Patton, "GMRES as a Multistep Transport Sweep Accelerator," *J. Trans. Theory Stat. Phys.* **28(1)**, 83, 1999.

B. W. Patton and J. P. Holloway, "Application of Krylov Subspace Iterative Methods to the Slab Geometry Neutron Transport Problems," 1996 ANS Radiation Protection and Shielding Division Topical Meeting, Cape Cod, MA.