# BAHMAN ZOHURI

**CAREER OBJECTIVES**

- Advisory role in Defense, Energy
- Advisory role in Naval Special Warfare (NSW) underwater communications
- Consultant to big 4 consulting firms
- Continue to serve as theleader onchallenging technicalprojects and delivermore than promised.
- Pursue a research career in physics, nuclear science or engineering and reactor physics.
- Return to more technical work in nuclear engineering and build on my recent research.
- Work with nuclear power industries and relative industries dealing with challenging issues such as energy conversion.
- Work with operations, risk analysis and risk management as well as safety analysis in the nuclear industry.

**EDUCATION:**

**PhD Nuclear Engineering:** University of New Mexico, concentration in Reactor Physics and Energy Conversion
**MS Mechanical Engineering:** University of New Mexico, concentration in Thermal Hydrolytic and Fluid Mechanics
**MS Physics:** University of Illinois, concentration in Plasma Physics
**BS Physics:** University of Illinois, concentration in Applied Physics

**TEACHING EXPERIENCE**

**5/12 – 4/14 University of New Mexico, Albuquerque, New Mexico, Lecturer**

I taught two separate courses in Thermodynamics, and its application in Nuclear and Chemical Engineering.

**9/96 – 9/99 Stanford University and FoothillCollege, Adjunct Professor**

I taughtcourses in Electrical Engineering and Material Scienceand developed the course outlines and materials to implement a web based course for off-campus students.

**6/94 – 11/94 United States Naval Academy, AnnapolisMD**

As an active duty Naval Officer, I taught Naval Weapons System and Applied Mathematics.

**INDUSTRIAL EXPERIENCE**

**11/2017 - Present** **Associate Research Professor**
**Electrical and Computer Engineering Department**
**University of New Mexico**
**Albuquerque New Mexico**

At this position I am involved with research, study and experimental work with High Energy Microwave (HEM) in support of existing contracts under this subject at UNM as part of teaming with Booz Allen Hamilton (BAH) on a re-compete for the NSWC support contract.

**6/88 – 5/17** **Senior Technical Consultant/Researcher and Manager**
**Galaxy Advanced Engineering**
**Burlingame, California**

I was involved with provide a situational awareness capability to Naval Special Warfare (NSW) operators that do not currently exist. This work is toward undersea wireless, electrical communication over many tens of meters to kilometers at high frequencies for command, control, situational awareness, reconnaissance, location, etc. using the a novel electrodynamics waves that has no magnetic, and thus is not so severely constrained by high conductivity of seawater, as regular radio waves are Visual contact with combat swimmers is impossible at long distances and during conditions of extremely poor visibility. Likewise, it is impossible for leaders to disseminate mission changes, or for divers to provide real-time status or reconnaissance reports, without a reliable means of communication. The proposed system will address both problems by determining the location (range and bearing information) of deployed divers, as well as by providing a means of Bi-direction or Omni-direction communications between divers

I also was involved with the resilience system which fed decision making data from different sources to a dashboard for man in the loop (actor) to take proper steps including requests for more data and recovery actions. The resilience system was a fully automated control system and thresholds were built upon multi-resource data fed through a master data management system that validated the integrity of the data from these multiple-sources. Then the validated information was sent to the dashboard for action by the actors (man in the loop).

I used Risk and Failure Analysis Tools as well as designed a model based on Fuzzy Logic that supported a Resilience Services tool and a Farmer's chart for licensing of new reactor designs based on the GEN IV design approach. This tool allows feeds from an enterprise database such as the Master Data Management pool to pull a logical sequence of events based on both Boolean and Fuzzy logic. This helps layout a better Probabilistic Risk Assessment, evaluate, and manage the risks faced when the threat is coming from Human, Operational, Repetitive, Procedural, and Project, Financial, Technical, Natural or Political sources. I built an automated control system based on a resilience approach for nuclear systems while operating as part of the electrical grid so they could be automatically responsive to demand fluctuations within the grid. This included any hostile or natural accident for the systems themselves or the grid to which they were supporting.

I contracted with Sandia National Laboratories (SNL) to support the development of operational hazard assessments for the Air Force Safety Center (AFSC) in concert with other DOD, DARPA and DOE interested parties. The intended use of the results was Air Force Instructions (AFIs) specifically issued for Directed Energy Weapon (DEW) operational safety. I completed the first version of a comprehensive library of detailed laser tools for ABL, ATL, THEL, M-THEL, etc. The laser library includes ABL's LRST (Laser Range Safety Tool), PUFF-TFT, PRONTO-3D, CTH, DYNA3D, ALE3D, and Medus-IB plus all necessary pre- and post-processors and the modifications to make the codes handle engagement conditions better and provide easy-to-understand output. (A significant portion of the work was classified.) I built a complete set of operational and integrated laser codes for the DEWs community. As part of this contract I was involved with improving the battle management software with an automated control system based on artificial intelligence as part of $C^3I$ (Command, Control, Communication and Intelligence) processes.

I improved a Nuclear Reactor physics code (NJOY) for Sandia Laboratories' application and converted MCNP (version A)to the PC for Oak Ridge National Laboratory correcting several FORTRAN glitches along the way.

I also participated in policy development, professional and technical strategic planning for next the generation of Project Management Software based on new specifications and utilization of Probabilistic Risk Assessment Methodologycharacterized by two quantities:

1. The magnitude (severity) of the possible adverse consequence(s), and
2. The likelihood (probability) of occurrence of each consequence.

As part of my other experience and consulting I have been involved with the following vendors and 500 fortune companies that are listed below:

**9/87 - 6/88** **Technical Staff Supervisor**
**Rockwell International Company**
**Anaheim, California**

As a member of technical staff, I supervised new contracts and requests for proposals including the technical content, budgets, and cost of contracts for different DOD and DOE Programs on SDI technologies. I was the task leader in charge of Nuclear Survivability and Radiation as well as Laser Hardening for the Exo-Atmospheric Re-entry Vehicle Intercept (ERIS) Program. In this position I was leading three engineers with Ph.D. with budget of 2M to do the task.

**1/83 - 9/87** **Senior Research Specialist**
**Lockheed Missile & Space Company, Inc.**
**Sunnyvale, California**

As the Senior Research Specialist I was engaged in R&D and the study of vulnerability, survivability and hardening of different payload components (i.e. IR Sensors) for the Defense Support Program (DSP), Boost Surveillance and Tracking Satellite (BSTS), MILSTAR (Military communication Satellite) and Space Surveillance and Tracking System (SSTS) against laser and nuclear threats. I studied and performed analyses of the characteristics of laser and nuclear radiation interaction with materials, TREE, EMP/EMI, SGEMP, SEU, blast and thermo-mechanical issues such as Hardness Assurance, Maintenance, and Device Technologies.

I was also involved with the Battle Management of Strategic Defense Initiative (SDI) program known as Star Wars as well as $C^3$ and Artificial Intelligent, Autonomy and Autonomous System.

The study calls for analyzing how to look for an electron emission, heat diffusion, absorbtivity, reflectivity and electromagnetic interaction of material surfaces. (Need to emphasize real time control programming)

As a system engineer I was in charge of authoring the budget and system performance requirements for Talon Gold.

**6/80 - 1/87** **Senior Design Engineer**
**Westinghouse Electric Corporation**
**Marine Division (Defense Group)**
**Sunnyvale, California**

As the Senior Design Engineer, I performed thermal hydraulic and natural circulation analyses for an Inherent Shutdown Heat Removal System (ISHRS) in the core of a fast breeder reactor, Pressurized and light water Reactors which was related to a Steam Cycle and Cooling System. The results were used to design Mercury Heat Pipe and Electromagnetic Pumps for Large Pool Concepts. This position required deep study and mathematical modeling using techniques such as Fluid Dynamic, Stress, Heat Transfer and Finite Elements/Finite Difference Analysis using Monte Carlo Simulations. I used FEA software and CFD codes such as NASTRAN, TRAYSYS, SINDA/FLUENT, MelCore, RELAP5, SCALE, DYNA3D and NIKE3D along with their Post and Pre-Processors to support such modeling. Results of this study were used for the US Navy Nuclear Population Program.

**TECHNICAL BACKGROUND ON COMPUTER SOFTWARE/HARDWARE**

- Over seven years of systems development in the life cycles of both hardware and software in environments such as Oracle, Sybase, Informix, JAVA Script, VB Script, HTML, Perl/CGI, Netscape Server, Apache Server

- Seven years of web site development using HTML Perl/CGI and Java to design real-time interactive web pages. Networked front ends for user-friendly information display, and sophisticated cross-platform applications.
- Four years of designing and developing databases and applications using Oracle Developer 2000, SQL*Forms, SQL*Plus, PowerBuilder, Visual C++ (Windows and X-Windows platforms), and Informix.
- Ten years of FORTRAN, and six years of C, C++ and BDF programming.
- Operating Systems: Windows 95/98/2000/XP/ME and NT, Sun/Solaris HP/UX, UNIX, LINUX, IBM/MVS, and VAX/VMS, Alpha/Open VMS.
- Experience designing and using project management software.

**TECHNICAL PUBLICATIONS**

***Books*:**

- Bahman Zohuri, " Nuclear Energy: Perspectives, Challenges and Future Directions" Nova Science Publishers, December, 2017
- Bahman Zohuri and Masoud Moghaddam, "Artificial Intelligence Driven by GEneral NEural SImulation System (GENESIS)", Nova Science Publishers, 2017
- Bahman Zohuri and Patrick McDaniel, " Combined Cycle Driven Efficiency for Next Generation Nuclear Power Plants: An Innovative Design Approach." Springer Publishing Company, 2017, 2nd Edition
- Bahman Zohuri, "Hybrid Energy Systems Driving Reliable Renewables Sources of Energy Storage", Springer Publishing Company, 2017
- Bahman Zohuri, "Physics of Cryogenics: An Ultralow Temperature Phenomenon", 1st edition, 2017, Published by Elsevier Publishing Company
- Bahman Zohuri and Masoud Moghaddam, "Neural Network Driven Artificial Intelligence: Decision Making Based on Fuzzy Logic", Nova science Publications, July 2017
- Bahman Zohuri and Masoud Moghaddam "Business Resilience System (BRS): Driven Through Boolean, Fuzzy Logics and Cloud Computation: Real and Near Real Time Analysis and Decision Making System", Springer Publishing Company, 2017
- Bahman Zohuri, “Heat Pipe Design and Technology: A Practical Approach.” Published by CRC and Francis Taylor Publishing Company, 2012.
- Bahman Zohuri, “Directed Energy Weapons Technologies.” Published by CRC and Francis Taylor Publishing Company, 2012.
- Bahman Zohuri, “Dimensional Analysis and Self-Similarity Methods for Engineers and Scientists.” Springer Publishing Company 2015.
- Bahman Zohuri, "Dimensional Analysis Beyond Pi Theorem" Springer Publishing Company, 2016
- Bahman Zohuri, “Thermal Hydraulic Analysis of Nuclear Reactors.” 2nd Edition, Springer Publishing Company, 2017
- Bahman Zohuri, " Inertial Confinement Fusion Driven Thermonuclear Energy", Springer Publishing Company, 2017
- Bahman Zohuri, "Magnetic Confinement Fusion Driven Thermonuclear Energy", Springer Publishing Company, 2017
- Bahman Zohuri, “Combined Cycle Driven Efficiency for Next Generation Nuclear Power Plants: An Innovative Design Approach.” Springer Publishing Company, 2015.
- Bahman Zohuri and Patrick McDaniel, “Thermodynamics in Nuclear Power Plant.” Springer Publishing Company, 2015.
- Bahman Zohuri, " Heat Pipe Design and Technology: Modern Applications for Practical Thermal Management", 2nd Edition, Springer Publishing Company, 2016
- Bahman Zohuri, " Plasma Physics and Controlled Thermonuclear Reactions Driven Fusion Energy", Springer Publishing Company, 2016
- Bahman Zohuri and Nima Fathi, “Thermal Hydraulic Analysis of Nuclear Reactors.” 1st Edition, Springer, Publishing Company, 2015

- Bahman Zohuri, " Compact Heat Exchangers: Selection, Application, Design and Evaluation", Springer Publishing Company, 2016
- Bahman Zohuri, “High Energy Laser (HEL): Tomorrow's Weapon in Directed Energy Weapons Volume I.” Trafford Publishing Company, Dec, 2014.
- Patrick McDaniel and Bahman Zohuri, “Introduction to Thermodynamics of Nuclear Power Plants.” Published by CRC, 2013.
- Bahman Zohuri, “High Energy Laser (HEL): Tomorrow's Weapon in Directed Energy Weapons Volume II.” Published by Trafford Publishing Company.
- Bahman Zohuri, "Nuclear Reactor and Neutronic Analysis" Published by Springer Publishing Company, 2016.

***Unclassified Papers*:**

- Charles Forsberg, Patrick McDaniel, and Bahman Zohuri, "Variable Electricity and Steam from Salt, Helium, and Sodium Cooled Base-Load Reactors with Gas Turbines and Heat Storage.” Proceedings of ICAPP 2015
- May 03-06, 2015 - Nice (France) Paper 15115
- Zohuri, B., P. McDaniel, A Comparison of a Recuperated Open Cycle (Air) Brayton Power Conversion System with the Traditional Steam Rankine Cycle for the Next Generation Nuclear Power Plant.” will be published in Nuclear Science.
- Zohuri, B. “Innovative Open Air Brayton Combined Cycle Systems for the next Generation Nuclear Power Plants.” University of New Mexico Publications, June 2014.
- McDaniel, P. J., B. Zohuri and C.R.E. de Oliveira, “A Combined Cycle Power Conversion System for Small Modular LMFBRs.” ANS Transactions, September, 2014.
- Zohuri, B., P. McDaniel, and C.R.E. de Oliveira, “A Comparison of a Recuperated Open Cycle (Air) Brayton Power Conversion System with the Traditional Steam Rankine Cycle for the Next Generation Nuclear Power Plant.” ANS Transactions, June, 2014.
- McDaniel. J., C. R. E.de Oliveira, B. Zohuri, and J. Cole, “A Combined Cycle Power Conversion System for the Next Generation Nuclear Power Plant.” ANS Transactions, November 2012.
- Journal of Computational Physics, Vol. 25, No.2, October 1977: "A General Method for an Accurate Evaluation of Exponential Integrals E1 (x), x >0”
- Applied Technology Publication on Inherent Shutdown Heat Removal System for Fast Breeder Reactors for Division of Reactor Research and Technology, U.S. Department of Energy
- Technical Publication on Seal Leakage from Canister-Launched MX Missile for U.S. Air Force, Ballistic Missile Office (November 1982).
- Technical Publication on Muzzle Blast from Canister-Launched MX Missile for U.S. Air Force, Ballistic Missile Office (December 1982).

**PATENTS AND COPYRIGHTS**

I also hold three patents in software and technical approaches to design of certain component of Nuclear Power plants including Pressurized and Light Water Reactors for Nuclear Propulsion of United States Navy Vessels.

**Laser Activated Radioactive Decay**

The need to store nuclear wastes for thousands of years to allow the long-lived radioactive fission products to decay can be eliminated by accelerating the radioactive decay of these nuclides. Spallation of fragmentation of radioactive nuclides is achieved by high-energy hydrodynamic shock waves produced by laser initiated thermonuclear reactions in deuterium-tritium blankets surrounding the fission products.

**Results of Thru-Bulkhead Initiation**

The conclusions derived from two studied on thru-bulkhead initiations using a donor less thru-bulkhead initiator. Through this study, the shock-lens phenomenon was discussed. Test results and a review of

physics theory discovered a unique method of initiating receptor explosives, pyrotechnics, and propellants less sensitive to shock initiation than PETN (pentaerythritol tetra nitrate).

**PERT Graphics Design Software in Project Management Application**.

This patent holds development software named EZPERT that is known as a Project Management Graphics tool, which supports any project management application tools such as Microsoft Project, VIS1ON, Primavera and Artemis on Multi-Platform Operation System.