Wayne Y. Lee, Ph.D., P.E.

Education

Brigham Young University	Ph.D.	Civil Engineering (Geotechnical / Computational Mechanics)	2006
Brigham Young University	M.S.	Civil Engineering (Structural Mechanics / Computer Graphics)	1986
Brigham Young University	B.S.	Civil Engineering (Structural Mechanics)	1983
Brigham Young University	B.S.	Mathematics (Applied Mathematics)	1983
University of Washington	–	Applied Mathematics & Engineering	1978-1980

Work Experiences

Civil & Environmental Engineering Capstone Program Director, BYU	2016 – Present
Adjunct Faculty, BYU	2016 – Present
Principal, Mountain West Engineering & Computing Consultations (MWECC)	1996 – 2016
Support Chief Technical Staff – Shock Physics Consultations, Raytheon	2013 – 2016
Shock Physics Consultations, PDS / Raytheon	2011 – 2013
Vice President / Director of Engineering, Pacific Engineering	2010 – 2011
Sr. Principal Engineer – Energetics / Shock Physics, Raytheon	2007 – 2010
Sr. Scientist – Weapon Effects, Applied Research Associates	2006 – 2007
Research Assistant/Ph.D. Candidate, BYU	2004 – 2006
Lead Engineer – Energetics & Shock Physics, Talley Defense Systems	1994 – 2004
Sr. Specialist Engineer – Composite Structures & Materials, Boeing	1990 – 1994
Sr. Engineer – Energetics & Materials, Talley Defense Systems	1986 – 1990
Engineer II – Energetics / Composite Structures, Hercules Aerospace Inc.	1984 – 1986
Research Assistant – DYNA-MOVIE.BYU, BYU	1982 – 1984
Engineering Intern – Solid Modeling, Control Data Corporation	1982

Professional Services, Development and Consultations

- Principal investigator for the geophysics/seismic acoustic signal acquisition & processing effort under contract with the "Urgent Services" Branch of the US Air Force
- Principal shock physicist/technical consultant for multiple advanced high-performance warheads/penetrators development programs (BLU-13X, Griffin, Tomahawk, ACM, NLOS, Paveway and JSOW) that demonstrated successfully against various hardened targets such as ultra-hard (i.e. much greater than 10,000 psi compressive strength) reinforced concrete, geo-materials (soil, rocks etc.) and armors

- Principal designer of a deep and large ultra-hard reinforced concrete target structure for the successful demonstration of a deep-penetration warhead
- Principal researcher & shock physicist for Raytheon's advance multi-phase, multi-physics target neutralization / defeat projects with reactive warhead liners and low collateral damages that resulted in three sole-source contract awards including the Tomahawk JMEWS/JCTD multi-years demonstration program
- Principal shock physicist/developer of a small plastic reactive shaped-charge warhead successfully penetrated against a thick and hardened armor target
- Technical consultant for nuclear reactor spent-fuel subjected to severe seismic activities for Nuclear Regulatory Commission
- Lead technical advisor for composite man-based berthing units development program in support of the Littoral Combat Ship (LCS), NSWC Panama City, FL
- Chief Engineer/Technical Advisor for NUWC/NWPT's Anti-Torpedo Torpedo (ATT) Navy battleship defense systems
- Chief Engineer – PEOSUB PMS-415 NUWC/NWPT's undersea composite torpedo launch tube development project
- Author & principal technical lead of the US Navy's 2010 Phase I SBIR (N102-144) Project winning proposal for combat ship based composite hazardous material satellite storage lockers
- Lead technical advisor for SOCOM/USN-SEAL's ISR mini-sub's composite mast structure
- Principal technical advisor for the advanced warhead penetration design collaborative project by Northrop Grumman/Talley/DE Technologies' Active Protection System Program
- Author and C++ programmer for ARA/DTRA's Integrated Munitions Effects Assessment (IMEA) software's multiple weapons aim point distribution pattern
- Co-author and C++ programmer for IMEA's tunnel attack effects assessment module
- Principal shock physicist at Talley for USMC, Army and USN-SEAL/SOCOM's fire-from-enclosure (FFE) and confined space (CS) shoulder-launch multipurpose assault weapon's (SMAW) design and proof-of-concept validation/demonstrations that resulted in follow-on and production contracts
- Principal failure investigator for the F-16 seat-back rocket failure investigation that resulted in the transferring of a renewable production contract to Talley from a sole-source competitor
- Principal technical lead for the XM-982 extended range rocket energetics' fracture tolerance study and propellant grain structure redesign effort
- Lead physicist for the M72 Lightweight Anti-Armor Weapon warhead fuze trembler enhancement redesign against brush sensitivity and hard target glancing blow environments
- Technical advisor and shock physics consultant for Texas Research Institute's submerged composite structure blast-resistant design, analysis and test activities
- Principal designer for multiple high strength reinforced concrete target structures in support of full scale warhead performance demonstrations
- Author of composite curved plate bending module for Boeing's workstation software used for 777 design/analysis
- Principal designer of the reinforced concrete test structure at Talley Defense Systems for high-magnitude impulsive rocket thrust tests – fully functional & operational since 1988
- Solid rocket propellant designer/analyst at Hercules for missile programs (A3, C4, D5, PII, MX, HEDI, SRAM, SRAM II and AALM)
- Fiber-composite case structure delamination analyst at Hercules for Space Shuttle's proposed large composite case structure

- Electro-static discharge induced solid rocket propellant initiation researcher at Hercules
- Organized Raytheon Missile Systems' Mechanical/Electrical Sub-system Inter-department technical exchange seminar
- Organizer/chair for Boeing's International Technical Exchange Conference on Engineering Optimizations
- Co-Chair for the 6th AIAA Biennial National Forum on Weapon System Effectiveness Sessions: 14-WSE-14 & 23-WSE-23
- Organized/taught engineering analysis/simulation short courses at ARA, Boeing & Talley

Professional Licenses

- Arizona & Washington, Professional Engineer (P.E.)
- Formerly in Utah, Professional Engineer (P.E.)

High Fidelity Modeling & Simulations

- LS-DYNA Explicit/Implicit FEM, BEM, SPH, Meshless, and Solid – Particle multi-physics hydrocode, LSTC
- ANSYS Implicit/Explicit FEA solver, ANSYS Inc.
- CTH Eulerian Finite Volume hydrocode, Sandia National Laboratories
- ALE-3D Arbitrary LaGrange/Euler hydrocode, Lawrence Livermore Laboratories
- MSC NASTRAN Implicit FEA solver, MSC
- Texgap/Texcap Implicit FEA solver, Anatech/USAF
- Hercules Aerospace's 62124/62114 Quasi-Static FEA solvers

Honors and Awards

- Raytheon Missile Systems' (RMS) Team Achievement Award, 2009, 2010, 2013, 2014
- RMS's Individual Technical Achievement Awards, 2009, 2010, 2013
- RMS's Tomahawk JMEWS/JCTD Program Technical Achievement Award, 2009
- RMS's Excellence in Engineering Award, 2009
- RMS's Tactical Tomahawk Program's Technical Achievement Award, 2008
- RMS's JSOW Program Letter of Commendation, 2008
- RMS's Conventional ACM Program Technical Achievement Award, 2008
- RMS's Strike Weapon Systems Division's Technical Achievement Award, 2007
- Tau Beta Pi, Engineering Honor Society, 1981
- Pi Mu Epsilon, Mathematics Honor Society, 1981

Languages

- C++, C#, C, FORTRAN, Unix/Linux Shell Scripts
- Read, write and speak Chinese

Professional & Technical Software Development

- SEG-Y seismic data interpreter, data reduction, and graphical post-processing modules (C#/C++/C)
- Mechanical and hydro-dynamic properties of metal/composite pre-processing modules for hydro-code and FEA software (C/C++)
- Warhead trajectory and fragmentation dispersion post-processing graphical display modules (C#/C++)
- Warhead jet-formation trade-study geometry definition module (MathCad/C++)
- AutoCad/ANSYS/MathCad/LS-DYNA – CTH LaGrangian-Eulerian model translator and geometry builder (C/C++)
- Advanced 2D / 3D fiber composites quasi-static and dynamic analysis modules (C/C++)
- LS-DYNA graphical pre-processing modules for composite structures (C/C++)
- ANSYS – LS-DYNA Implicit FEA – Explicit FEA Modeling Translator (C/C++)
- Structural mechanics, vibrations and blast shock physics-based closed-form analysis modules (C/C++)
- 2-D/3-D Calligraphic Graphics Processing Modules for FEA & internal ballistics post-processing module (FORTRAN/C/C++)
- XBOLT thread geometry and load analysis module (C/C++)
- TEXCAP/TEXGAP Pre- and Post-Processors (FORTRAN)
- DYNA-MOVIE.BYU – Contour Triangulations for High Performance Calligraphic Display (FORTRAN, MS Thesis)
- Advanced Mortgage Analysis Program (MAP) – Loan Pay-Off Optimizations (C/C++)

Publications/Presentations

- BYU CEEn Capstone Program, ASEE RMS Conference, 2017
- Advanced Ground-Based Depth Surveillance Technology Using Advanced Wireless Seismic Equipment, Urgent Services, 2015
- Deep Penetration Data Capturing & Processing Using Advanced Wireless Seismic Equipment, Urgent Services, 2014
- Advanced Multi-Phase/Multi-Physics Target Neutralization Methodology & Development Demonstrations, NAWS, China Lake, 2009
- Advanced Approach to Quantify Strength Consistency of Large High Strength Reinforced Concrete Target Structures for Full Scale Warhead Experiments, 6th AIAA Biennial National Forum on Weapon System Effectiveness, 2009
- Numerical Modeling of Blast-Induced Soil Liquefaction, 7th World Congress on Computational Mechanics, 2006
- Incorporation of Optimization Techniques in Finite Element Analysis of Structural Components, AIAA/ASME/SAE/ASEE Joint Propulsion Conference, 1989
- Solid Propellant Mechanical Properties Data Reduction Using Computer Code, JANNAF Propulsion Conference, 1987

Inventions and Patents

- U.S. Patent #8037829/8240251 10/18/2011 Reactive Shaped Charge
- U.S. Patent #9347754   05/14/2016 Fuze Shock Transfer System
- U.S. Patent #9683822   06/20/2017 Munition with Preformed Fragments
- U.S. Patent #9816793   11/14/2017 Shock-Resistant Fuzewell for Munition
- U.S. Patent #9835429   12/05/2017 Shock Attenuation Device

- WIPO International Patent – Publication #2011142847   (11/17/2011)
  Pressure and Frequency Modulated Non-Lethal Acoustic Weapon.
- WIPO International Patent – Publication #20120024180   (08/14/2012)
  Reactive Shaped Charge, Reactive Liner, and Method for Target Penetration
- WIPO International Patent – Publication #2015175037   (02/11/2015)
  Munition with Outer Airframe
- WIPO International Patent – Publication #2016131467   (12/05/2016)
  Fuze Shock Transfer System
- WIPO International Patent – Publication 20160370159   (12/21/2016)
  Penetrator Munition with Enhanced Fragmentation
- WIPO International Patent – Publication 2015175039   (12/21/2016)
  Munition Comprising a Penetrator and an External Harness
- WIPO International Patent – Publication 20160377396   (12/21/2016)
  Munition with Multiple Fragment Layers
- WIPO International Patent – Publication #20170115108   (05/12/2017)
  Shock Attenuation Device with Stacked Non-Viscoelastic Layers
- WIPO International Patent – Publication #20170138711   (05/18/2017)
  Munition Having Penetrator Casing with Fuel-Oxidizer Mixture Therein
- WIPO International Patent – Publication #20160349027   (06/20/2017)
  Munition with Preformed Fragments
- WIPO International Patent – Publication #20170167839   (11/14/2017)
  Shock-Resistant Fuzewell for Munition

- European Patent #WO/2015/175037   (09/27/2017)
  Munition with Airframe
- European Patent #WO/2015/175039   (09/27/2017)
  Munition Comprising a Penetrator and an External Harness

- U.S. Patent Internal Ref. #13-5515: Maximum Effect for Area Neutralization Weapon, Pending, 2013
- U.S. Patent Internal Ref. #14-6729: Low Collateral Target Defeat Mechanism for Hard Target Penetrators, Pending, 2014
- U.S. Patent Internal Ref. #13-4420-WO-PCT1: Enhanced Fragmentation for Hard Target Penetrator, Pending, 2013
- U.S. Patent Internal Ref. #13-4420-WO-PCT2: Penetrator Munition with Enhanced Fragmentation, Pending, 2015
- U.S. Patent Internal Ref #13-4420-WO-PCT3: Munition with Nose Kit Connecting to Aft Casing Connector, Pending, 2015

- U.S. Patent Internal Ref. #13-4420-WO-PCT4: Munition with Outer Enclosure, Pending, 2015
- U.S. Patent Internal Ref. #13-4420-WO-PCT5: Munition with Multiple Fragment Layers, Pending, 2015

Professional Affiliations

- Former member of AIAA, NDIA, SAMPE, SAE, JANNAF and ASCE
- Former JANNAF Solid Propellant Mechanical Behaviors Sub-Committee member
- Former JANNAF Modeling & Simulations Sub-Committee member