SEOKBIN (BIN) LIM, Ph.D.

Pete V. Domenici Endowed Associate Professor
Energetic Systems Research Group
Department of Mechanical Engineering
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Research Scientist (Joint appointment)
EMRTC (Energetic Materials Research and Testing Center)
New Mexico Tech
801 Leroy Place, Socorro, NM 87801

EXPERTISE

Energetic material science/technology/safety, Shock/Tension physics, Computational modeling, Design of energetic-mechanical systems, Mechanics of detonation gas, Shaped charges (CSCs and LSCs), EFPs.
US citizen.

EDUCATION

Ph.D. Energetic Material (EM) emphasis, Missouri S&T (formerly University of Missouri-Rolla), Rolla, MO, May 2006
Dissertation title: Investigation of the Blade Formation Process of Linear Shaped Charges

M.S. Energetic Material (EM) emphasis, Missouri S&T (formerly University of Missouri-Rolla), Rolla, MO, Dec 2003
Thesis title: Investigation of the Characteristics of Linear Shaped Charges used in Demolition

B.S. Mechanical Design Engineering. Chungnam National University, South Korea, February 2000

EMPLOYMENT HISTORY

Jul 2020 ~ Current	Department Chair, Department of Mechanical Engineering New Mexico Institute of Mining Technology, Socorro, NM
Oct 2018 ~ June 2019	Associate Department Chair, Department of Mechanical Engineering New Mexico Institute of Mining Technology, Socorro, NM
May 2014 ~ Current	Research Scientist, EMRTC (Joint Appointment) New Mexico Institute of Mining Technology, Socorro, NM
May 2013 ~ Current	Associate Professor (tenured), Department of Mechanical Engineering New Mexico Institute of Mining Technology, Socorro, NM
Jan 2008 ~ May 2013	Assistant Professor, Department of Mechanical Engineering New Mexico Institute of Mining Technology, Socorro, NM
Aug 2006 ~ Dec 2007	Research Assistant Professor, Department of Mechanical Engineering New Mexico Institute of Mining Technology, Socorro, NM

TECHNICAL SKILLS

- INSTRUMENTATION: Various types of explosives testing equipment including: EBW detonator systems, Blasting chamber operation, Ultra-high speed camera system (millions/sec ranges), Low-speed camera system (thousands/sec ranges), Digital Image Correlation Techniques, Electronic detonator system (manufactured by Daveyfire Inc.), VISAR (velocity interferometer systems for any reflector), Two-stage light-gas gun operation, etc.
- COMPUTATION: AUTODYN™, LS-Dyna, AutoCAD™, Solidworks™, LAMMPS, etc.

CERTIFICATIONS/TRAINING/AWARD AND SCHOLARSHIP

- Endowed Professorship: Pete V. Domenici Endowed Associate Professor, Aug 2018
- Rockwell Laser Safety Officer (LSO) Training, Rockwell industries. San Diego, CA, June 5th ~ 8th, 2012
- LS-DYNA™ Advanced Training, Schwer Engineering & Consulting Services. Troy, MI, May 1st ~ 4th, 2012
- LS-DYNA™ Introductory Training, LSTC, Inc. Livermore, CA, July 1st ~ 6th, 2011
- DoD Information Assurance Awareness training, Online training, Jan 2011
- DHS Career Development Grant (CDG) recipient, 2009
- Society of Explosives Engineers Education Foundation, Dr. Persson Scholarship, September 2005

- Certified training on "A primer on explosion effects in the air, water and soil", 76th Shock and Vibration Symposium, Destin, FL, Oct 31, 2005
- AUTODYN™ Introductory Training, Century Dynamics, Inc. Concord, CA, August 22nd ~ 26th, 2005
- Relief from Federal Explosive Disabilities, Authorized by Bureau of Alcohol, Tobacco, Firearm and Explosives (BATF), February 2005
- Society of Explosives Engineers Education Foundation, Dr. Persson Scholarship, August 2004
- Missouri Limestone Producers Association, MLPA Certified Blaster, since May 2004
- Premiere Pyrotechnics: Lead Pyrotechnician, Trained in NFPA-1123, January 2003
- International PADI, PADI Certified Underwater Rescue Diver, since July 1997

RESEARCH ACTIVITIES

- 04/20-Present NASA NM Space Grant Consortium, Research Initiation Grant "Space Science and Engineering: Materials under extreme dynamic tension" PI.
- 10/17-Present NASA EPSCoR Program funded "NASA EPSCoR AutoCom" Co-PI.
- 10/14-Present Federal Aviation Administration (FAA) COE-CST (Center of Excellence in Commercial Space Transportation) "Task 299 & 377: Nitrous Oxide Composite Tank Testing, Phase II~V" (Oct 2014~current). PI.
- 10/09-10/19 Office of Naval Research (ONR) funded "Development of Novel Methodological Approaches for the Rapid Creation of Expedient Tactical Entry Holes in Typical Urban Wall Systems (Phase I ~ IV)" (Oct, 2009 ~ Oct, 2019). PI (delayed in annual funding increment).
- 03/17-12/18 Office of Naval Research (ONR) funded Defense University Research Instrumentation Program (DURIP) "Visualization of Extreme Dynamic Events" PI.
- 02/17~04/17 Karagozian & Case Applied Science and Engineering. "Integrated Blast Panel Testing" PI.
- 11/14-03/16 Karagozian & Case (K&C) funded "Concrete Penetration Testing", and other multiple contracts. PI.
- 11/15 Los Alamos National Lab (LANL) Education Equipment Gift Program (LEEG), PI.
- 06/09-09/12 Sandia National Laboratory (SNL) funded "An Engineering Design of Linear Shaped Charges Driven by Electro-magnetic Forces (Phase I ~ III)". PI.
- 09/08-09/12 Department of Homeland Security (DHS) funded "DHS HS-STEM Career Development Grant (CDG): New Mexico Tech Explosives Engineering HS-STEM Program" (Sep, 2008 ~ Sep, 2012, No-cost extended). PI.
- 05/08-08/11 National Science Foundation (NSF) funded "Course Curriculum, and Laboratory Improvement (CCLI): Explosives Engineering Laboratory for Undergraduate (EELU)" - Phase I (May, 2008 ~ Aug, 2011). Co-PI.
- 05/07-03/08 Development of an innovative excavation (deep drilling) system utilizing exothermic amplification of pulsed electromagnetic power (EAPERD project) - Phase I (Sep, 2007 ~ Mar, 2008, Co-PI), funded by Boyer & Associates, Lombard, IL 60148. Co-PI
- 11/06-05/07 Participated in the preliminary development of military vehicle protection system, (APS: Active Protection System) from incident RPG attack using Linear Shaped Charges technology - Project title: "DARPA iron curtain project". Consultant

OTHER RESEARCH EXPERIENCES

- 06/05-08/06 Conceptual development/design of general multi-purpose blast mitigation systems to protect civil structures from incident blast occurrences - Project title: "Development of blast mitigation system for civil structures", sponsored by Department of Air Force.
- 01/04-05/04 Defined and developed methods for breaching reinforced concrete walls using Linear Shaped Charges - Project title: "Axi-Symmetric Shaped Charge Breaching Tool", sponsored by Corps of Engineers
- 07/01-05/03 Performed study on Glass Microspheres as Taggants for the Detection and Identification of Explosive Materials, sponsored by BATF Contract : TATF-99-11
- 01/02 Steel structure demolitions using Linear Shaped Charges with a progressive collapse method - Conveyer Structure Demolition, Missouri Limestone Inc., Springfield, MO

- 03/21/02 Participated in steel bridge demolition using Linear Shaped Charges - Sappington Bridge Demolition, Crawford Co, MO - results reported in "Sappington Bridge: An Opportunity for Strengthening Research and Demolition Training" in ISEE (Baird, J., 2003)
- 10/01-03/02 Participated in creating an artificial entrance from the surface into Carroll Cave at a location known as the T-Junction with minimizing any disturbance to the geology and biology of the cave, Camden Co, MO - results reported in "Blasting A New Entrance to Carrol Cave" in ISEE (Bowles, J., et al, 2003)
- 11/01 Participated in steel structure demolitions using Linear Shaped Charges as main cutting devices and electronic detonator systems -Power Plant Ball Mill Demolitions, Ameren Corp. St. Louis, MO

INSTITUTIONAL SERVICE

- Leading an EPA (Educational Partnership Agreement) with Naval Surface Warfare Center: Indian Head (2019)
- NMT Safety & Compliance Committee (tentative) Organizer/Chair, (Since 2019)
- NMT AFT (Academic Freedom & Tenure) Committee member, (Since 2018)
- NMT ASAC (Academic Standard & Admission Committee) member, (2017)
- Participate in the NMT Faculty Mentoring Program: Paired with Dr. Gilberto Gonzales, (2017)
- NMT Faculty Development Events: Participate as a Research and Tenure panel member, (2016)
- Co-chair, NMT Distance Education Committee, (Oct 2009)
- ISEE Student chapter advisor at New Mexico Tech, (2006 – present)

DEPARTMENTAL SERVICE

- Department Chair (July 2020~Present)
- Acting Department Chair (various times and Summer 2019)
- Associate Department Chair (Oct 2018~June 2019)
- NMT MENG Department Grad Program coordinator, (Since 2018)
- NMT Mechanical Department Safety Officer (Since 2015)
- NMT Mech. Eng. Dept. Tenure Guideline Committee Chair
- NMT Tenure review committee member
- Mechanical Department Laser Safety Officer (LSO) since summer (2012)

PROFESSIONAL ACTIVITIES

- IBS (International Ballistics Society) outreach committee chair (appointed), (2017)
- Invited Editorial board member 'Human Factors and Mechanical Engineering for Defense and Safety', Springer (2017)
- International Symposium on Ballistics (ISB) educational committee member (university membership)
- Paper reviewer: JIMSS (Journal of Intelligent Material Systems and Structures)
- Paper reviewer: Sensor, MDPI publication
- Paper reviewer: Applied Science, MDPI publication
- Paper reviewer: Journal of Applied Physics, AIP
- Paper reviewer: AIP Advanced
- Paper reviewer: Journal of Energetic Materials
- Abstract reviewer: International Symposium on Ballistics
- DAPS (4th International Conference on Design and Analysis of Protective Structures): session chair, (2012)
- SMASIS (Smart Materials Adaptive Structures & Intelligent Systems): session chair, (2011)
- Member of American Society of Naval Engineers (ASNE) (2010)
- Invited Editorial board member of 'International Research Publication House' (April 2009)
- ISEE mentoring program, committee member (2009 – present)
- U.S. Army Corps of Engineers' Engineer Research and Development Center's (ERDC) FY08 Basic Research solicitation proposal peer reviewer (2008)
- International Society of Explosives Engineers (ISEE) educational committee member (2006 – present)
- Active member of International Society of Explosives Engineers (ISEE) (2000 – present)

COURSE DEVELOPMENT/ INSTRUCTION

- MENG 545 (EXPL 311): Introduction to Explosives Engineering
  Introduction to the broad field of explosives science and technology covering the following topics: Basic organic chemistry, decomposition reactions, properties of explosives, thermodynamics of explosives, shock wave theory, detonation theory, initiators, Gurney equations, blast effects and demolition.
- MENG 549 (EXPL 412): Wave Propagation
  An in-depth study of the propagation of waves in various media. The derivation and application of the Rankine-Hugoniot jump equations. The concept of the rarefaction wave and various wave interactions.
- MENG 550: Advanced Explosives Engineering
  The detonation of non-ideal explosives, shaped charge effect and explosively formed projectiles. Explosive welding and experimental methods used in the evaluation of explosives and their applications.
- MENG 553: Numerical Modeling of Detonation
  Introduction to the hydrodynamic modeling in explosives application. Numerical methods for modeling shock physics, detonation, and material response. Finite element method and smoothed particle hydrodynamic methods, equation of state and strength models, and numerical fracture and fragmentation.
- MENG 555 (EXPL 418): Shock propagation in Air
  Introduction to the shock physics in air and structural response under strong air blast loading. An understanding of the basic shock propagation behaviors depending on the air properties variation, air blast formation, shock reflection (normal vs. oblique shock), and fundamentals of structural systems and evaluation.
- MENG 586L: Special Topic -Explosives Science and Application Lab
  Introduction of the multi-disciplinary fields of engineering hands-on knowledge of explosives including mechanics and applications of explosives. Based on multi-disciplinary areas of engineering of explosives, students can learn more in-depth and hands-on based explosives application and science, providing different levels of achievement, starting with the basic science and moving toward more advanced engineering applications.

REFEREED JOURNAL & CONFERENCE PAPERS

Lim, Seokbin, Philipp Baldovi "Observation of the velocity variation of an explosively driven flat flyer depending on the flyer width" Applied Sci, 9 (97), 2019.

Lim, Seokbin, "Liner Collapse Line of Linear Shaped Charges" Journal of Energetic Materials, http://dx.doi.org/10.1080/07370652.2016.1203378, 2016.

Lim, Seokbin, "Jet flight patterns of Linear Shaped Charges" Journal of Energetic Materials, volume 35, Issue 1, page 14-25, 2016

Lim, **Seokbin**, "Jet velocity profile of LSCs". 28th International Symposium on Ballistics, p237~246. Sep 2014.

Lim, Seokbin. "Acceleration profile of a flat flyer driven by detonation isentrope" Propellants Explosives Pyrotechnics, 38(3), 410-418, 2013

Lim, Seokbin, "Jet Velocity Profile of Linear Shaped Charges Based on the Arced Liner" Journal of Energetic Materials, 31(4), 239~250, 2013

Matthew Johnston & **Seokbin Lim** "Numerical observation of the jet flight patterns of linear shaped charges". Appl. Sci. 2(3), 629~640, 2012

Lim, Seokbin, "Steady State Equation of Motion of a Linear Shaped Charges Liner" International Journal of Impact Engineering, 44, 10~16, 2012

Indeck, J. and Thompson, A. and **Lim, Seokbin**, "Numerical Analysis of Damage Propagation for Shaped Charge Jet Impacts into a Concrete Target" I-Manager's Journal on Civil Engineering. Vol. 1. No 2. 55~62, Mar 2011

Lim, Seokbin, Paul Worsey, "An investigation of the functioning and side effects of LSCs" Explosives and Blasting. KSEE, Vol. 23, No. 4, 45~55, Mar 2005.

Mathe, S.A., and **Seokbin, Lim**, "Acceleration and Deformation of an Explosively-Driven Metal Plate," Proceedings of the 41st Annual ISEE Conference. Feb 2015

Seokbin Lim, "Review of Equations of Motion of Linear Shaped Charges Liner", 40th Annual Conference in Explosives and Blasting Technique. Feb 2014

Indeck, J., Thompson, A., **Lim, Seokbin**, "Penetration Analysis of a Shaped Charge Jet into a Concrete Target" Proceedings of the 36th Annual conference of ISEE, San Diego, Feb 2011.

Lim, Seokbin, "Deformation of An Explosively Driven Flat Metallic Flyer During Projection" Proceedings of the 36th Annual conference of ISEE, 2010. Orlando, FL.

Walsh, GA. Wilson, A.T. **Lim, Seokbin**, and Romero, V.D. "Design and Testing of an Underwater Passive Pressure Gauge" Proceedings of the 35thAnnual conference of ISEE, 2009

Vogel. P., **Lim, Seokbin**. "Case Study of the Application of Gurney Equations to Simplified Shrapnel Lethality Estimation in Comprehensive Military Utility Analysis Models" Interservice/Industry Training, Simulation and Education Conference (I/ITSEC), 2008
Lim, Seokbin, Baird, J., Worsey, P.N., "Mechanics of the Run up on Linear Shaped Charges Cutting", Proceedings of the 32nd Annual conference of ISEE, 2006
Lusk, B., **Lim, Seokbin**, Worsey, P.N., Frost, L., "Large Arena Test Simulator Using Small High Explosive Charges", Proceedings of the 32nd Annual conference of ISEE, 2006
Lim, Seokbin, Lusk, B., Worsey, P.N., "Mechanisms of Linear Shaped Charge Cutting – A New Explanation", Proceedings of the 31st Annual conference of ISEE, 2005
Lim, Seokbin, Worsey, P.N., "An Introduction to the Halo Effect", Proceedings of the 31st Annual conference of ISEE, 2005
Lim, Seokbin, Worsey, P.N., "An Investigation of The Characteristics of Linear Shaped Charges Used in Demolition", ISEE 29th Annual conference ISEE, 2003

CONFERENCE PRESENTATIONS

Lim, Seokbin, Philipp Baldovi "Extreme Dynamic Tension (Preliminary Research)", Aeroballistics Range Association (ARA) Conference, Bath, UK, Oct, 2018
Lim, Seokbin, "Near Field Blast – Detonation gas ball and its vicinity", Office of Naval Research EXPO Tech Talk, July, 2017
Seokbin Lim, "Shock Physics and Explosives Engineering" NEMI (National Energetic Materials Initiative) meeting, New Mexico Tech August 30-31, 2016.
Seokbin Lim, "Jet velocity profile of LSCs". 28th International Symposium on Ballistics, proceedings p237~246. Sep 2014.
Seokbin Lim, Liner Collapse & Jetting Process of Linear Shaped Charges (LSCs), 84th Shock and Vibration Symposium, Atlanta, GA, Nov 2013
Seokbin Lim, "Acceleration profile of a flat flyer driven by detonation product isentrope" 83rd Shock and Vibration Symposium, New Orleans, LA, Nov 2012
Indeck, J and **Lim, Seokbin**, "Damage Propagation in a Concrete Block Under the Shaped Charge Jet Impact" 4th International Conference on Design and Analysis of Protective Structures, Jeju, South Korea, May 2012.
Lim, Seokbin, "A Steady State LSCs Liner Collapse Model Based on Birkhoff Theory" Proceedings of the ASME 2011 Conference on Smart Materials Adaptive Structures & Intelligent Systems (SMASIS), Scottsdale, AZ, Sep 2011.
Brent Meins (Advisor: **Lim, Seokbin**), "Novel structural Control for Multi-Hazard Protection" DHS (Department Homeland Security) 5th Annual University Network Summits, D.C. Mar 2011.
C. R. Findlay and **Lim, Seokbin**. "Preliminary Functional Relations Derived From Geometrical Analysis and a Modified Birkhoff Theory for Linear Shaped Charge Optimization" International Test and Evaluation Association (ITEA) conference 2010, El Paso, TX.
Lim, Seokbin, "A Preliminary Investigation of the Blade Formation Process of Linear Shaped Charges" CEMED (Center for Energetic Materials and Energetic Devices) Internal Conference, EMRTC, Socorro, NM, Feb 27th, 2007
Lim, Seokbin, Lusk, B., Worsey, P.N., "An Investigation of The Blade Formation & Cutting Process of Linear Shaped Charges", Proceedings of the Annual conference of Korea Institute of Military Science and Technology (KIMST), Aug 30, 2005
Lim, Seokbin, Lusk, B., Worsey, P.N., "The Characteristic of Blade Formation/Cutting Process of Linear Shaped Charges (LSCs)", 76th Shock & Vibration Symposium, Oct 30, 2005

OTHER PRESENTATIONS & INVITED SEMINARS

Lim, Seokbin, "Explosives Engineering" MENG 110 invited seminar, Sep 2018
Lim, Seokbin, "Nitrous oxide composite case testing" NMT petroleum dept seminar, 2017 Nov
Lim, Seokbin, "Shock physics and explosives engineering" Chungnam National Univ. Mechanical Design Engineering Dept. Seminar, Taejon, South Korea, June 2017.
Lim, Seokbin, "Analysis of tension shock", EMRTC Employee Enrichment week, Socorro, NM. Jan 2015.
Lim, Seokbin, "Jet flight patterns of LSC", 2nd Annual TechTalk, NMT, Socorro, NM. Oct 2015.
Lim, Seokbin, "Shock physics and its application", CNU Dept. of Mechanical Design, Taejon Korea, June 2015.
Lim, Seokbin, "Jet flight patterns of LSC", ADD (Agency for Defense Development), Taejon Korea, June 2015.
Lim, Seokbin, "Acceleration profile of a flat flyer driven by detonation product isentrope", MAE Department, New Mexico State Univ. Invited Seminar, Las Cruces, NM. April 2014.

Lim, Seokbin, "Jet flight patterns of LSC", EMRTC guest seminar, Socorro, NM. July 2014.
Lim, Seokbin, "Acceleration Profile of An Explosively Driven Flat Metallic Flyer During Projection", NMT & ADD Inter-Institutional Meeting, Socorro, NM. July 2013.
Lim, Seokbin, "Determination of the Velocity Profile of Shaped Charges Jet" Department of Petroleum Engineering at NMT, Projection consortium meeting, Invited Speaker, May 2012.
Lim, Seokbin, "Development of the Active Protection System (APS) Utilizing Linear Shaped Charges Against Incoming RPG", Graduate Seminar, Department of Mechanical Engineering, NMT, Sep 2010. Socorro, NM.
Lim, Seokbin, "Emerging Technologies for National Security Applications and Energetic Systems Research Group at NMT" Agency for Defense Development (ADD), Invited Seminar. Taejon, South Korea, June 26th, 2008
Lim, Seokbin, "Initiation of Energetic Materials and Theoretical Characteristics" Korea Institute of Geology, Mining and Materials (KIGAM), Invited Seminar, Taejon, South Korea, June 24th, 2008
Lim, Seokbin, "Fundamental Characteristics and Applications of Energetic Materials", Department of Mechanical Design Engineering, Chungnam National University, Guest Lecture, Taejon, South Korea, June 16th, 2008
Lim, Seokbin, "Characteristics of Explosives and IED Detection Technology" Karagozian & Case, Internal Quarterly Seminar, Invited Seminar, Burbank, CA 17th Jan, 2008
Lim, Seokbin, "Characteristics of linear shaped charge jet and its formation", Society for Mining, Metallurgy, and Exploration (SME) chapter meeting, St. Louis, MO, Guest speaker, May 20th, 2004
Lim, Seokbin, "The Detailed Characteristics of Linear Shaped Charges Used in Demolition", Korea Institute of Geoscience & Mineral Resources (KIGAM), Taejon, Korea, Quarterly Seminar, Guest speaker, June 18th, 2004