MULTISCALE MECHANICS & MATERIALS LABORATORY
MECHANICAL ENGINEERING | THE UNIVERSITY OF UTAH

ASHLEY D. SPEAR

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EDUCATION

M.S./Ph.D. Civil Engineering, Cornell University 2014
Structural Engineering Option
Minor: Theoretical and Applied Mechanics
Dissertation: *Numerical and Experimental Studies of Three-Dimensional Crack Evolution in Aluminum Alloys: Macroscale to Microscale*
Advisor: Anthony Ingraffea

B.S. Architectural Engineering, *summa cum laude*, University of Wyoming 2007
Structural Design Option
Minor: Honors Program

EMPLOYMENT

Associate Professor, Department of Mechanical Engineering, University of Utah	07/2020-current
Adjunct Professor, Kahlert School of Computing, University of Utah	02/2023-current
Adjunct Professor, Materials Science & Engineering, University of Utah	09/2018-current
Assistant Professor, Department of Mechanical Engineering, University of Utah	07/2014-06/2020

HONORS & AWARDS

2023:	Constance Tipper Medal, International Congress on Fracture
2022:	Presidential Scholar Award, University of Utah
2022:	1st Place (team award), NIST AM Bench, Predicting Subcontinuum Tensile Behavior
2021:	Professor of the Year Award, University of Utah Dept. of Mechanical Engineering
2020:	ASTM International Additive Manufacturing Young Professional Award
2020:	Top Performer (team award), AFRL Additive Manufacturing Modeling Challenge 4
2020:	Outstanding Researcher Award, University of Utah Dept. of Mechanical Engineering
2019:	TMS Early Career Faculty Fellow Award
2018:	National Science Foundation Faculty Early CAREER Award
2018:	Early Career Teaching Award, University of Utah
2018:	College of Engineering Outstanding Teaching Award, University of Utah
2017,2018:	Outstanding Teaching Award, University of Utah Dept. of Mechanical Engineering
2017:	Career and Professional Development Faculty Recognition Award, University of Utah
2016:	U.S. Air Force Research Laboratory Summer Faculty Fellowship
2015:	U.S. Air Force Office of Scientific Research Young Investigator Award
2008:	National Science Foundation Graduate Research Fellowship
2008:	Olin Fellowship, Cornell University
2007:	Wyoming Student Engineer of the Year, awarded by the Wyoming Engineering Society
2007:	Top Graduate, University of Wyoming Architectural Engineering Department
2007:	Commencement Ceremony Speaker, University of Wyoming College of Engineering
2006:	University of Wyoming Leadership Scholarship, awarded by ASUW
2003-2007:	University of Wyoming Presidential Scholarship

FEDERALLY FUNDED RESEARCH (*Spear portion: **$6.456M***)

Project:	INL Materials Data Science: In Support of Augmented Machine Intelligence for Critical Infrastructure
Source:	**Department of Energy (DOE) Battelle Energy Alliance, LLC**
Amount:	$83k (PI share: **$82,574**)
Duration:	11/2022-09/2023

Project:	Physics-Informed Artificial Intelligence for Parallel Design of Metal Matrix Composites and their Additive Manufacturing
Source:	**National Science Foundation DMREF/GOALI**
Amount:	$1.8M (co-PI share: **$622,222**)
Duration:	09/2021-08/2025

Project:	Unveiling the Governing Mechanisms of Fatigue Failure in Additively Manufactured Aluminum
Source:	**National Science Foundation CAREER**
Amount:	$560k (PI share: **$559,733**)
Duration:	09/2018-08/2023

Project:	Forensic Tool to Identify Fall Characteristics in Infant Skull Fracture
Source:	**National Institute of Justice**
Amount:	$558k (co-PI share: **$266,277**)
Duration:	01/2021-12/2023

Project:	Mountain West Manufacturing Network – Phase III
Source:	**DoD Office of Local Defense Community Cooperation**
Amount:	$1.23M (co-PI share: **$611,946**)
Duration:	07/2021-12/2022

Project:	Institute for Ultra-Strong Composites by Computational Design (US-COMP)
Source:	**NASA Space Technology Mission Directorate**
Amount:	$15M (co-PI share: **$332,500**)
Duration:	09/2017-08/2022

Project:	Novel 3D Experiments, Simulations, and Optimization for Accelerated Design of Metallic Foams
Source:	**National Science Foundation DMREF/GOALI**
Amount:	$1.05M (PI share: **$499,599**)
Duration:	09/2016-08/2021

Project:	Benchmarking Microscale Ductility Measurements
Source:	**DOE Nuclear Energy University Program (NEUP)**
Amount:	$776K (co-PI share: **$168,025**)
Duration:	10/2018-09/2022

Project:	Development of High-Throughput High-Energy Diffraction Microscope
Source:	**National Science Foundation Major Research Instrumentation**
Amount:	$1.56M (co-PI share: **$240,533**)
Duration:	09/2017-08/2021

Project: Predicting Skull Fracture Patterns from Head Impact in Infants
Source: **National Institute of Justice**
Amount: $610k (co-PI share: **$225,079**)
Duration: 01/2017-12/2020

Project: ADAPT Mountain West Manufacturing Network – Phase II
Source: **DoD Office of Economic Adjustment**
Amount: $2.68M (co-PI share: **$1,186,007**)
Duration: 02/2019-07/2020

Project: 3D Multiscale Modeling Combined with Machine Learning for a Novel Structural-Prognosis Framework
Source: **Air Force Office of Scientific Research Young Investigator Award**
Amount: $330k (PI share: **$330,590**)
Duration: 04/2015-04/2018

Project: ADAPT Mountain West Manufacturing Network – Phase I
Source: **DoD Office of Economic Adjustment**
Amount: $2.73M (co-PI share: **$1,331,262**)
Duration: 01/2017-06/2018

INTERNALLY FUNDED GRANTS (*Spear portion: **$960,845***)

Project: Acquisition of a Laser Powder Bed Fusion Machine at the U
Source: **University of Utah Vice President for Research** (plus cost-share fundraising)
Amount: **$772,445**
Date: 01/2022

Project: Precision Microstructure Evaluation Supporting Advanced 3D Metals Manufacturing (EDS/EBSD on dbFIB)
Source: **University of Utah Vice President for Research** (plus cost-share fundraising)
Amount: **$188,400**
Date: 03/2016

PREVIOUS RESEARCH EXPERIENCE

Cornell Fracture Group, Cornell University, Ithaca, NY 2010-2014
Graduate Student Researcher

NASA Langley Research Center, Hampton, VA 2011-2012
Visiting Researcher
Funded by: *NSF Graduate Research Fellowship*
Topic: Microstructurally small fatigue crack initiation and early propagation in ultrathin, aluminum-alloy, pressure-vessel structures

Cornell Fracture Group, Cornell University, Ithaca, NY 2008-2010
Graduate Student Researcher
Funded by: NASA Aviation Safety Program
Topic: Surrogate modeling and high-fidelity, elastic-plastic, fracture simulations for application to real-time, residual-strength predictions of damaged structures

Stanford University, The Blume Earthquake Engineering Center, Stanford, CA summer 2007
Undergraduate Student Researcher

Funded by: Pacific Earthquake Engineering Research (PEER) Center, NSF
Topic: Loss estimation of modern, reinforced-concrete, moment-resisting frame buildings

NASA Glenn Research Center, Cleveland, OH summer 2005
Undergraduate Student Researcher
Funded by: Wyoming Space Grant Consortium
Topic: Quantification of fire signatures for practical spacecraft materials

TEACHING

University of Utah, Department of Mechanical Engineering
Associate Professor:
- Statics (ME EN 2010): 2022,2023-2024
- Continuum Mechanics (ME EN 5530/6530): 2021, 2022

Assistant Professor:
- Fatigue and Fracture Mechanics (ME EN 7530): 2015, 2017, 2019
- Intro. to Finite Elements (ME EN 5510/6510): 2016
- Statics (ME EN 1300/2010): 2015, 2016, 2018, 2019

Cornell University, School of Civil and Environmental Engineering
Instructor of record:
- Modern Structures (CEE 1160): 2013

Research mentor for undergraduate engineering student (Amanda Priest), 06/2009-08/2010

PROFESSIONAL SERVICE

Editorial board member for academic journals:
- *Fatigue & Fracture of Engineering Materials & Structures (FFEMS)*
- *Engineering Fracture Mechanics (EFM)*

Chair: Computational Materials Science and Engineering (CMSE) Committee, TMS (2024-2025)
Vice chair: Computational Materials Science and Engineering (CMSE) Committee, TMS (2022-2023)
Guest editor:
- *JOM* (Data-Driven Materials Investigations: The Next Frontier in Understanding and Predicting Fatigue Behavior). Volume 70, No. 7.
- *FFEMS* (special issue – TMS Fatigue). Volume 39, No. 6.

Conference organizer:
- International Congress on Fracture (ICF15): Beyond Similitude: Role of Multiscale Heterogeneity in Fracture Prognosis Symposium, Co-organizer (2023)
- TMS Annual Meeting, AI/Data Informatics: Computational Model Development, Validation, and Uncertainty Quantification Symposium, Co-organizer (2023)
- TMS Annual Meeting, Fatigue in Materials Symposium, *Lead Organizer* (2017,2018)
- TMS Annual Meeting, Fatigue in Materials Symposium, Co-organizer (2016,2019-2023)
- International Conference on Texture of Materials, Symposium on Texture and Anisotropy in Advanced Engineering Materials, Co-organizer (2017)
- MS&T, Symposium on Additive Manufacturing, Co-organizer (2016)

Panelist: NSF (multiple panels) · Center for Integrated Nanotechnologies (CINT) · TMS Awards Review Panel for Structural Materials Division (SMD)
Memberships: The Minerals Metals and Materials Society (TMS) · American Society for Metals (ASM) International · U.S. Association for Computational Mechanics (USACM) · International Association for Computational Mechanics (IACM)
Peer reviewer: Engineering Fracture Mechanics · Acta Materialia · Corrosion Science · International Journal of Fatigue · International Journal of Fracture · AIAA Journal · Journal of Engineering Materials and Technology · Journal of the Mechanics and Physics of Solids

· Journal of Microscopy · Journal of Computational Physics · International Journal of Plasticity · JOM · Advanced Engineering Materials · Materials Science and Engineering: A · Ceramics International · Materials Characterization

GRADUATE-STUDENT AND POST-DOCTORAL ADVISEES

Position	Name	Start Date	End Date	Subsequent Employment
Postdoc	Nadia Kouraytem	05/2017	08/2020	Utah State University (*tenure-track faculty*)
Postdoc	Aowabin Rahman	01/2018	04/2020	Pacific Northwest National Laboratory
Postdoc	Krishna Prasath Logakannan	09/2022	-	-
Postdoc	Brian Phung	01/2023	-	-
Ph.D.	Brian Phung	05/2015	12/2022	Postdoctoral Researcher (MMM Lab)
Ph.D.	Karen DeMille	08/2016	06/2022	Air Force Research Laboratory
Ph.D.	Dongfang Zhao	08/2016	-	-
Ph.D.	Dillon Watring	05/2017	04/2021	Naval Research Laboratory (*NRC Postdoc*)
Ph.D.	Vignesh Babu Rao	08/2019	-	-
Ph.D.	Laura Ziegler	06/2021	-	-
Ph.D.	Claire Ticknor	08/2022	-	-
M.S.	Kyle Pierson	01/2017	05/2019	Nvidia
M.S.	Carl Herriott	08/2017	12/2019	Sandia National Laboratories
M.S.	John Erickson	05/2018	12/2019	Sandia National Laboratories
M.S.	Quinton Johnson	08/2018	10/2020	Los Alamos National Laboratory
M.S.	Junyan (Jimmy) He	08/2018	05/2020	UIUC (Ph.D. student)
M.S.	Carter Cocke	08/2019	07/2022	Caltech (Ph.D. student)
M.S.	Elliott Marsden	05/2021	-	-
M.S.	Jacob Hirst	08/2022	-	-

OUTREACH & NOTABLE INVOLVEMENT

Acquisition of University of Utah's First LPBF Machine (link), 2023

Led the acquisition of an Aconity3D MIDI laser powder bed fusion (LPBF) machine at the University of Utah, including internal fundraising (~$772k) plus infrastructure renovation

NIST Additive Manufacturing Benchmark (AM Bench) (link), 2022

Team lead in predicting subcontinuum mesoscale tensile response of as-built IN625 *(awarded 1st place in predicting tensile behavior)*

Air Force Research Laboratory (AFRL) Additive Manufacturing Modeling Challenge (link), 2020

Team lead in collaborative participation involving University of Utah, Carnegie Mellon University, and Los Alamos National Laboratory *(named Top Performer for Challenge #4)*

Third Sandia Fracture Challenge, 2017

Faculty advisor for classroom participation in the Sandia Fracture Challenge, resulting in publication with 20 students as co-authors (see Publication 16 below)

Junior League of Salt Lake City (link), 2017-2020

Director of Women's Services for the Community Assistance and Resource Event (CARE Fair) Committee – responsible for coordinating with Intermountain Medical Center and community

volunteers to provide free annual exams and mammogram vouchers for low-income and uninsured women throughout Utah

Sandia Nonlinear Mechanics and Dynamics (NOMAD) Research Institute, 2016
Faculty mentor to two graduate students from Arizona State Univ. and the Univ. of Pennsylvania

Mathematics Engineering Science Achievement (MESA link), 2015, 2016
Technical evaluator for National Engineering Design Competition for high school students

NASA Speakers Bureau (link), 2012-2014
Traveled to provide age-appropriate presentations on STEM to underrepresented students (grades 6-12) at summer camps, career fairs, assemblies, and in classroom settings

Cornell CURIE Academy Project Leader, summer 2013
Responsible for designing science experiments and guiding students through the experiments as part of a week-long summer camp for high-school females interested in science

President, University of Wyoming President's Senior Class Ambassadors, 2006-2007
Spearheaded establishment of $50K+ endowment *(unprecedented for a student group on campus)*

University of Wyoming Presidential Search Committee, Student Representative, 2006
Sole student representative selected to serve on search committee charged with recommending the 23rd president of the University of Wyoming

PUBLICATIONS (*student and post-doctoral advisees are underscored*)

Refereed Journal Articles

47. W. Tan & **A.D. Spear**, Multiphysics Modeling Framework to Predict Process-Microstructure-Property Relationship in Fusion-Based Metal Additive Manufacturing, ***Accounts of Materials Research***, Vol. 5(1), pp. 10-21, 2024. https://doi.org/10.1021/accountsmr.3c00108
46. B.R. Phung, D.A. Greeley, M. Yaghoobi, J.F. Adams, J.E. Allison, **A.D. Spear**, Predicting Microstructurally Sensitive Fatigue-crack Path in WE43 Magnesium Using High-fidelity Numerical Modeling and Three-dimensional Experimental Characterization, ***Fatigue & Fracture of Engineering Materials & Structures***, Vol. 47(3), pp. 862-883, 2024. https://doi.org/10.1111/ffe.14210
45. D.A. Greeley, J.F. Adams, P. Kenesei, **A.D. Spear**, J.E. Allison, Quantitative Analysis of Three-dimensional Fatigue Crack Path Selection in Mg Alloy WE43 Using High Energy X-ray Diffraction Microscopy, ***Fatigue & Fracture of Engineering Materials & Structures***, 2024. https://doi.org/10.1111/ffe.14217
44. K.J. DeMille, **A.D. Spear**, Convolutional Neural Networks for Expediting the Determination of Minimum Volume Requirements for Studies of Microstructurally Small Cracks, Part II: Model Interpretation, ***Computational Materials Science,*** Vol. 227, pp. 112261, 2023. https://doi.org/10.1016/j.commatsci.2023.112261
43. C.K. Cocke, H. Mirmohammad, M. Zecevic, B.R. Phung, R.A. Lebensohn, O.T. Kingstedt, **A.D. Spear**, Implementation and Experimental Validation of Nonlocal Damage in a Large-strain Elasto-viscoplastic FFT-based Framework for Predicting Ductile Fracture in 3D Polycrystalline Materials, ***International Journal of Plasticity***, Vol. 162, pp. 103508, 2023. https://doi.org/10.1016/j.ijplas.2022.103508
42. Q.C. Johnson, P. Kenesei, S. Petruzza, J.C. Plumb, H. Sharma, J.-S. Park, E. Marsden, K. Matheson, M.W. Czabaj, **A.D. Spear**, Mapping 3D Grain and Precipitate Structure during In Situ Mechanical Testing of Open-cell Metal Foam using Micro-computed Tomography and High-energy X-ray Diffraction Microscopy, ***Materials Characterization***, Vol. 195, pp. 112477, 2023. https://doi.org/10.1016/j.matchar.2022.112477
41. Q.C. Johnson, C.M. Laursen, **A.D. Spear**, J.D. Carroll, P.J. Noell. Analysis of the Interdependent Relationship between Porosity, Deformation, and Crack Growth During Compression Loading of LPBF AlSi10Mg, ***Materials Science and Engineering: A***, Vol. 852, pp. 143640, 2022. https://doi.org/10.1016/j.msea.2022.143640

40. K.J. DeMille, **A.D. Spear**. Convolutional Neural Networks for Expediting the Determination of Minimum Volume Requirements for Studies of Microstructurally Small Cracks. Part I: Model Implementation and Predictions, ***Computational Materials Science***, Vol. 207, pp. 111290, 2022. https://doi.org/10.1016/j.commatsci.2022.111290
39. D.S. Watring, J.T. Benzing, O.L. Kafka, L.-.A Liew, N.H. Moser, J. Erickson, N. Hrabe, **A.D. Spear**. Evaluation of a Modified Void Descriptor Function to Uniquely Characterize Pore Networks and Predict Fracture-Related Properties in Additively Manufactured Metals, ***Acta Materialia***, Vol. 223, pp. 117464, 2022. https://doi.org/10.1016/j.actamat.2021.117464
38. L. Wiesent, **A.D. Spear**, A. Nonn. Computational Analysis of the Effects of Geometric Irregularities on the Interaction of an Additively Manufactured 316L Stainless Steel Stent and a Coronary Artery, ***Journal of the Mechanical Behavior of Biomedical Materials***, Vol. 125, pp. 104878, 2022. https://doi.org/10.1016/j.jmbbm.2021.104878
37. S. Detwiler, D.S. Watring, **A.D. Spear**, B. Raeymaekers. Relating the Surface Topography of As-built Inconel 718 Surfaces to Laser Powder Bed Fusion Process Parameters Using Multivariate Regression Analysis, ***Precision Engineering***, Vol. 74, pp. 303-315, 2022. https://doi.org/10.1016/j.precisioneng.2021.12.003
36. B. Phung, J.Y. He, **A.D. Spear**. A Surface-mesh Gradation Tool for Generating Gradated Tetrahedral Meshes of Microstructures with Defects, ***Computational Materials Science***, Vol. 197, pp. 110622, 2021. https://doi.org/10.1016/j.commatsci.2021.110622
35. C. Cocke, A.D. Rollett, R.A. Lebensohn, **A.D. Spear**. The AFRL Additive Manufacturing Modeling Challenge: Predicting Micromechanical Fields in AM IN625 Using an FFT-Based Method with Direct Input from a 3D Microstructural Image, ***Integrating Materials and Manufacturing Innovation***, 2021. https://doi.org/10.1007/s40192-021-00211-w
34. D. Zhao, K.E. Matheson, B.R. Phung, S. Petruzza, M.W. Czabaj, **A.D. Spear**. Investigating the Effect of Grain Structure on Compressive Response of Open-cell Metal Foam using High-fidelity Crystal-plasticity Modeling, ***Materials Science & Engineering: A***, Vol. 812, pp. 140847, 2021. https://doi.org/10.1016/j.msea.2021.140847
33. N. Shirolkar, P. Patwardhan, A. Rahman, **A.D. Spear**, S. Kumar. Investigating the Efficacy of Machine Learning Tools in Modeling the Continuous Stabilization and Carbonization Process and Predicting Carbon Fiber Properties, ***Carbon***, Vol. 174, pp. 605-616, 2021. https://doi.org/10.1016/j.carbon.2020.12.044
32. N. Kouraytem, X. Li, W. Tan, B. Kappes, **A.D. Spear**. Modeling Process-structure-property Relationships in Metal Additive Manufacturing: A Review of Physics-driven versus Data-driven Approaches, ***Journal of Physics: Materials***, 2021. doi.org/10.1088/2515-7639/abca7b
31. A. Rahman, P. Deshpande, M. Radue, G. Odegard, S. Gowtham, S. Ghosh, **A.D. Spear**. A Machine Learning Framework for Predicting the Shear Strength of Carbon Nanotube-Polymer Interfaces Based on Molecular Dynamics Simulation Data, ***Composites Science and Technology***, Vol. 207, pp. 108627, 2021. https://doi.org/10.1016/j.compscitech.2020.108627
30. N. Kouraytem, J. Varga, B. Amin-Ahmadi, H. Mirmohammad, R.A. Chanut, **A.D. Spear**, O.T. Kingstedt. A Recrystallization Heat-treatment to Reduce Deformation Anisotropy in Additively Manufactured Inconel 718, ***Materials & Design***, Vol. 198, pp. 109228, 2021. doi.org/10.1016/j.matdes.2020.109228
29. J. Yan, J.Y. He, **A.D. Spear**, B. Coats. The Effect of Impact Angle and Fall Height On Skull Fracture Patterns in Infants, ***Journal of Biomechanical Engineering***, Vol. 143(7), pp. 071004, 2021. https://doi.org/10.1115/1.4050460
28. L. Wiesent, U. Schultheiß, P. Lulla, U. Noster, T. Schratzenstaller, C. Schmid, A. Nonn, **A.D. Spear**. Computational Analysis of the Effects of Geometric Irregularities and Post-processing Steps on the Mechanical Behavior of Additively Manufactured 316L Stainless Steel Stents, ***PLOS ONE***, Vol. 15(12), pp. e0244463, 2020. https://doi.org/10.1371/journal.pone.0244463

27. J. Erickson, A. Rahman, **A.D. Spear**. A Void Descriptor Function to Uniquely Characterize Pore Networks and Predict Ductile-metal Failure Properties, ***International Journal of Fracture***, Vol. 225, pp. 47-67, 2020. doi.org/10.1007/s10704-020-00463-1
26. D.S. Watring, J.T. Benzing, N. Hrabe, **A.D. Spear**. Effects of Laser-energy Density and Build Orientation on the Structure-Property Relationships in As-built Inconel 718 Manufactured by Laser Powder Bed Fusion, ***Additive Manufacturing***, Vol. 36, pp. 101425, 2020. doi.org/10.1016/j.addma.2020.101425
25. C. Herriott, **A.D. Spear**. Predicting Microstructure-dependent Mechanical Properties in Additively Manufactured Metals with Machine- and Deep-learning Methods, ***Computational Materials Science***, Vol. 175, pp. 109599, 2020. doi.org/10.1016/j.commatsci.2020.109599
24. J.Y. He, J. Yan, S. Margulies, B. Coats, **A.D. Spear**. An Adaptive-remeshing Framework to Predict Impact-induced Skull Fracture in Infants, ***Biomechanics and Modeling in Mechanobiology*** , Vol. 19(5), pp. 1595-1605, 2020. doi.org/10.1007/s10237-020-01293-9
23. N. Kouraytem, R.A. Chanut, D.S. Watring, T. Loveless, **A.D. Spear**, O.T. Kingstedt. Dynamic-loading Behavior and Anisotropic Deformation of Pre- and Post-heat-treated IN718 Fabricated by Selective Laser Melting, ***Additive Manufacturing***, Vol. 33, pp. 101083, 2020. doi.org/10.1016/j.addma.2020.101083
22. S. Petruzza, A. Gyulassy, S. Leventhal, J.J. Baglino, M. Czabaj, **A.D. Spear**, V. Pascucci. High-throughput Feature Extraction for Measuring Attributes of Deforming Open-cell Foams, ***IEEE Transactions on Visualization and Computer Graphics***, Vol. 2(1), pp. 140-150, 2020. doi.org/10.1109/TVCG.2019.2934620
21. K.J. DeMille, **A.D. Spear**. Determination of Representative Volume Elements for Small Cracks in Heterogeneous, Linear-Elastic Domains, ***Engineering Fracture Mechanics***, Vol. 220, pp. 106643, 2019. doi.org/10.1016/j.engfracmech.2019.106643
20. K. Pierson, A. Rahman, **A.D. Spear**. Predicting Microstructure-sensitive Fatigue-crack Path in 3D Using a Machine Learning Framework, ***JOM***, Vol. 71(8), pp. 2680-2694, 2019. doi.org/10.1007/s11837-019-03572-y
19. D.S. Watring, K.C. Carter, D. Crouse, B. Raeymaekers, **A.D. Spear**. Mechanisms Driving High-cycle Fatigue Life of As-built Inconel 718 Processed by Laser Powder Bed Fusion, ***Materials Science & Engineering: A***, Vol. 761, pp. 137993, 2019. doi.org/10.1016/j.msea.2019.06.003
18. N. Kouraytem, X. Li, R. Cunningham, C. Zhao, N. Parab, T. Sun, A.D. Rollett, **A.D. Spear**, W. Tan. Effect of Laser-matter Interaction on Molten Pool Flow and Keyhole Dynamics, ***Physical Review Applied***, Vol. 11(6), pp. 064054, 2019. doi.org/10.1103/PhysRevApplied.11.064054
17. S.L.B. Kramer, B.L. Boyce, A. Jones, A. Mostafa, B. Ravaji, T. Tancogne-Dejean, C. Roth, M. G. Bandpay, K. Pack, J.T. Foster, M. Behzadinasab, J. Sobotka, J.M. McFarland, J. Stein, **A.D. Spear**, et al. The Third Sandia Fracture Challenge: Predictions of Ductile Fracture in Additively Manufactured Metal, ***International Journal of Fracture***, Vol. 218(1-2), pp. 5-61, 2019. doi.org/10.1007/s10704-019-00361-1
16. **A.D. Spear**, M.W. Czabaj, P. Newell, K.J. DeMille, D. Zhao, B.R. Phung, et al. The Third Sandia Fracture Challenge: From Theory to Practice in a Classroom Setting, ***International Journal of Fracture***, Vol. 218(1-2), pp. 171-194, 2019. doi.org/10.1007/s10704-019-00366-w
15. J. Tucker, **A.D. Spear**. A Tool to Generate Grain-resolved Open-cell Metal Foam Models, ***Integrating Materials and Manufacturing Innovation***, pp. 1-10, 2019. doi.org/10.1007/s40192-019-00136-5
14. R.B. Leavy, J.E. Guilkey, B.R. Phung, **A.D. Spear**, R.M. Brannon. A Convected-particle Tetrahedral-domain Integration Technique in the Material Point Method for Mesoscale Modeling of Ceramics, ***Computational Mechanics***, pp. 1-21, 2019. doi.org/10.1007/s00466-019-01670-x
13. B.R. Phung, **A.D. Spear**. A Voxel-based Remeshing Framework for the Simulation of Arbitrary Three-dimensional Crack Growth in Heterogeneous Materials, ***Engineering Fracture Mechanics***, Vol. 209, pp. 404-422, 2019. doi.org/10.1016/j.engfracmech.-2019.01.008

12. C. Herriott, X. Li, N. Kouraytem, V. Tari, W. Tan, B. Anglin, A.D. Rollett, **A.D. Spear**. A Multi-scale, Multi-physics Modeling Framework to Predict Spatial Variation of Properties in Additive-Manufactured Metals, ***Modelling and Simulation in Materials Science and Engineering***, Vol. 27, pp. 025009, 2019. doi:10.1088/1361-651X/aaf753
11. J. Plumb, J. Lind, J. Tucker, R. Kelley, **A.D. Spear**. Three-dimensional Grain Mapping of Open-cell Metallic Foam by Integrating Synthetic Data with Experimental Data from High-energy X-ray Diffraction Microscopy, ***Materials Characterization***, Vol. 144, pp. 448-460, 2018. doi:10.1016/j.matchar.2018.07.031
10. K. Pierson, J. Hochhalter, **A.D. Spear**. Data-driven Correlation Analysis between Observed 3D Fatigue-crack Path and Computed Fields from High-fidelity, Crystal-plasticity, Finite-element Simulations, ***JOM***, Vol. 70, No. 7, pp. 1159-1167, 2018. doi:10.1007/s11837-018-2884-2
9. **A.D. Spear**, S. Kalidindi, B. Meredig, A. Kontsos, J.B. le Graverend. Data-driven Materials Investigations: The Next Frontier in Understanding and Predicting Fatigue Behavior, ***JOM***, Vol. 70, No. 7, pp. 1143-1146, 2018. doi:10.1007/s11837-018-2894-0
8. J. Feliciano, G. Cortina, **A.D. Spear**, M. Calaf. Generalized Analytical Displacement Model for Wind Turbine Towers under Aerodynamic Loading, ***Journal of Wind Engineering & Industrial Aerodynamics***, Vol. 176, pp. 120-130, 2018. doi:0.1016/j.jweia.2018.03.018
7. K. Matheson, K. Cross, M. Nowell, **A.D. Spear**. A Multiscale Comparison of Stochastic Open-Cell Aluminum Foam Produced Via Conventional and Additive-manufacturing Routes, ***Materials Science & Engineering: A***, Vol. 707, pp. 181-192, 2017. doi:10.1016/j.msea.2017.08.102
6. A. Kontsos, T. Zhai, **A.D. Spear**, C. Muhlstein. Guest Editorial: Special Issue TMS – Fatigue, ***Fatigue & Fracture of Engineering Materials & Structures***, Vol. 39, No. 6, pp. 651-651, 2016. doi:10.111/ffe.12438
5. **A.D. Spear**, J.D. Hochhalter, A.R. Cerrone, S.F. Li, J.F. Lind, R.M. Suter, A.R. Ingraffea. A Method to Generate Conformal Finite-Element Meshes from 3-D Measurements of Microstructurally Small Fatigue-Crack Propagation, ***Fatigue & Fracture of Engineering Materials & Structures***, Vol. 39, No. 6, pp. 737-751, 2016. doi:10.111/ffe.12449

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4. **A.D. Spear**, S.F. Li, J.F. Lind, R.M. Suter. A.R. Ingraffea, Three-Dimensional Characterization of Microstructurally Small Fatigue-Crack Evolution Using Quantitative Fractography Combined with Post-Mortem X-Ray Tomography and High-Energy X-Ray Diffraction Microscopy, ***Acta Materialia***, Vol. 76, pp. 413-424, 2014. doi:10.1016/j.actamat.2014.05.021
3. **A.D. Spear**, A.R. Ingraffea. Effect of Chemical Milling on Low-cycle Fatigue Behavior of an Al-Mg-Si Alloy, ***Corrosion Science***, Vol. 68, pp. 144-153, 2012. doi:10.1016/j.corsci.2012.11.006
2. C.M. Ramirez, A.B. Liel, J. Mitrani-Reiser, C.B. Haselton, **A.D. Spear**, J. Steiner, G.G. Deierlein, E. Miranda. Expected Earthquake Damage and Repair Costs in Reinforced Concrete Frame Buildings, ***Earthquake Engineering & Structural Dynamics***, Vol. 41, No. 11, pp. 1455-1475, 2012. doi:10.1002/eqe.2216
1. **A.D. Spear**, A.R. Priest, M.G. Veilleux, J.D. Hochhalter, A.R. Ingraffea. Surrogate Modeling of High-fidelity Fracture Simulations for Real-time Residual Strength Predictions, ***AIAA Journal***, Vol. 49, No. 12, pp. 2770-2782, 2011. doi:10.2514/1.55295

Refereed (Archival) Conference Proceedings

6. K.J. DeMille, J.R. Leigh, R. Hall, I. Guven, **A.D. Spear**. CNN-Informed Genetic Algorithm for Optimizing Mechanical Performance of Carbon Nanotube Microscale Bundles, ***AIAA SCITECH 2023 Forum,*** 2023, pp. 0771. https://doi.org/10.2514/6.2023-0771
5. K. Matheson, K. Cross, I. Javahery, J. Plumb, **A.D. Spear**. Comparison of Conventional Open-Cell Aluminum Foam and Its Additively Manufactured Twin, ***Proceedings of the 2016 Materials Science & Technology Conference***, 2016, pp. 745-752.

4. **A.D. Spear**, S.F. Li, A.R. Cerrone, J. Lind, R.M. Suter, A.R. Ingraffea. 3D Microscale Characterization and Crystal-Plastic FE Simulation of Fatigue-Crack Nucleation and Propagation in an Aluminum Alloy, ***Proceedings of the 2013 Materials Science & Technology Conference***, 2013, pp. 1641-1648.
3. A.R. Cerrone, **A.D. Spear**, J. Tucker, C. Stein, A.D. Rollett, A.R. Ingraffea. Modeling Crack Nucleation at Coherent Twin Boundaries in Nickel-based Superalloys, ***Proceedings of the 2013 Materials Science & Technology Conference***, 2013, pp. 1649-1656.
2. **A.D. Spear**, A.R. Ingraffea. Microstructurally Small Fatigue-Crack Growth in Thin, Aluminum-Alloy, Pressure-Vessel Liner, ***Procedia Engineering***, (10)2011, pp. 686-691.
1. **A.D. Spear**, J.D. Hochhalter, A.R. Ingraffea. Simulation of Discrete-Source Damage Growth in Aircraft Structures: A 3D Finite Element Modeling Approach, ***Proceedings of the 12th International Conference on Fracture***, 2009.

Technical Reports and Archival Data Dissemination

5. J.D. Carroll, … Q.C. Johnson, **A.D. Spear**, et al. Identifying Rare Disqualifying Flaws in AM Components, ***SAND-2020-10655***, Sandia National Laboratories, 2020.
4. J.C. Plumb, J.F. Lind, J.C. Tucker, R. Kelley, **A.D. Spear**. Raw and Processed Data to Generate Three-Dimensional Grain Map of Open-Cell Aluminum Foam, ***NIST Materials Data Repository***, 2018. http://hdl.handle.net/11256/975
3. K. Matheson, K. Cross, M. Nowell, **A.D. Spear**. Reconstructed and Analyzed X-ray Computed Tomography Data of Investment-Cast and Additve-Manufactured Aluminum (6061) Open-Cell Foam, ***NIST Materials Data Repository***, 2017. http://hdl.handle.net/11256/949
2. K. Matheson, K. Cross, M. Nowell, **A.D. Spear**. Reconstructed and Analyzed X-ray Computed Tomography Data of Investment-Cast and Additive-Manufactured Aluminum Foam for Visualizing Ligament Failure Mechanisms and Regions of Contact During a Compression Test, ***Data in Brief***, Vol. 16, pp. 601-603, 2018. doi:10.1016/j.dib.2017.11.072
1. **A.D. Spear**, A.R. Priest, M.G. Veilleux, J.D. Hochhalter, A.R. Ingraffea. Surrogate Modeling of High-fidelity Fracture Simulations for Real-time Residual Strength Predictions, ***NASA TM-2011-216879***, 2011.

INVITED SEMINARS

28. **Carnegie Mellon University -** Workshop on Methods for 3D Microstructure Studies (August 2023). Pittsburgh, Pennsylvania. "Characterizing microstructure-sensitive mechanical response of open-cell metal foams using high-fidelity models and in-situ experiments".
27. **Sandia National Laboratories -** 3D Characterization Community, Technical Seminar Series (August 2023). Virtual. "Characterizing microstructure-sensitive mechanical response of open-cell metal foams using high-fidelity models and in-situ experiments".
26. **University of Wisconsin - Madison** - Computing in Engineering Forum (September 2022). Virtual. "Predicting ductile failure in AM metals".
25. **Georgia Tech -** Invited seminar in the School of Materials Science and Engineering (April 2022). Atlanta, Georgia. "Characterizing microstructure-sensitive mechanical response of open-cell metal foams using high-fidelity models and in-situ experiments".
24. **University of Illinois Urbana Champaign (UIUC)** - Graduate Seminar, Department of Aerospace Engineering (November 2021). "Characterizing microstructure-sensitive mechanical response of open-cell metal foams using high-fidelity models and in-situ experiments".
23. **Colorado School of Mines** - Distinguished Guest Seminar, Department of Mechanical Engineering (April 2021). "Characterizing microstructure-sensitive mechanical response of open-cell metal foams using high-fidelity models and in-situ experiments".
22. **Georgia Tech -** Invited seminar in the School of Aerospace Engineering (October 2019). Atlanta, Georgia. "Predicting microstructure-sensitive mechanical behavior of materials by integrating physics-based modeling with machine learning".

21. **Ohio State University** - Materials Science and Engineering colloquium (April 2019). Columbus, Ohio. "A multi-scale, multi-physics modeling framework to predict spatial variation of properties in additive-manufactured metals".
20. **University of California, Santa Barbara (UCSB)** - Invited seminar in the Department of Materials (February 2019). Santa Barbara, California. "A multi-scale, multi-physics modeling framework to predict spatial variation of properties in additive-manufactured metals".
19. **Virginia Commonwealth University** - Invited seminar in Mechanical and Nuclear Engineering (December 2018). Richmond, Virginia. "A data-driven approach to predict microstructurally small crack evolution".
18. **Texas A&M University** - Graduate seminar in Department of Mechanical Engineering (October 2018). College Station, Texas. "A multi-scale, multi-physics modeling framework to predict spatial variation of properties in additive-manufactured metals".
17. **PRISMS Workshop** - Presentation at annual workshop of DOE BES-funded PRISMS Center (August 2018). Ann Arbor, Michigan. "Three-dimensional characterization and modeling of crack propagation in polycrystalline metals".
16. **Army Research Laboratory** - Invited seminar (May 2018). Aberdeen Proving Ground, Maryland. "Site-specific property maps of additively manufactured (AM) metals using a mesoscale, multi-physics modeling framework".
15. **Mechanics in Scientific Discovery** - Presentation at invitation-only workshop (June 2017). Florence, Italy. "On the use of machine learning to discover predictors of small-scale crack growth".
14. **Brigham Young University** - Graduate seminar in Department of Mechanical Engineering (February 2017). Provo, Utah. "Combining synchrotron imaging with numerical modeling to elucidate microstructure-sensitive phenomena in polycrystalline materials".
13. **Advanced Photon Source** - APS User Science Seminar (October 2016). Argonne National Laboratory. "3D grain mapping to inform high-fidelity numerical simulations of microstructurally small phenomena".
12. **Sandia National Laboratories** - Invited seminar at Sandia Engineering Sciences Center (August 2016). Albuquerque, New Mexico. "Combining experiments, simulation, and machine learning to investigate small-crack growth mechanisms in 3D".
11. **International Union of Theoretical and Applied Mechanics** - IUTAM Symposium on Integrated Computational Structure-Material Modeling of Deformation and Failure under Extreme Conditions (June 2016). Baltimore, Maryland. "Integrating data from experiments & simulations to elucidate small-crack growth mechanisms".
10. **ASM Spring Symposium** - Eastern New York Chapter of ASM International Spring Symposium at GE Global Research Center (April 2016). Niskayuna, New York. "Combining experiments, modeling, and machine learning to study 3D crack propagation".
9. **Duke University** - Seminar in Department of Civil Engineering (January 2016). Durham, North Carolina. "Improving understanding and prediction of microstructurally small crack growth by coupling experimental observations, numerical simulations, and machine learning".
8. **University of Michigan** - Seminar in Department of Materials Science and Engineering (January 2016). Ann Arbor, Michigan. "Improving understanding and prediction of microstructurally small crack growth by coupling experimental observations, numerical simulations, and machine learning".
7. **Johns Hopkins University** - Seminar in Department of Civil Engineering (June 2015). Baltimore, Maryland. "Multi-scale modeling of microstructurally small fatigue cracks in an aluminum alloy from synchrotron-based measurements".
6. **University of Utah** - Joint seminar in Materials Science & Engineering and Metallurgical Engineering (March 2015). "Multi-scale modeling of microstructurally small fatigue cracks in an aluminum alloy from synchrotron-based measurements".
5. **University of Tennessee** - Department of Civil and Environmental Engineering Fall Seminar Series (October 2014). Knoxville, Tennessee. "3D digital reconstruction and numerical modeling of microstructurally small fatigue cracks in an aluminum alloy from synchrotron-based measurements".

4. **Hill Air Force Base** - Seminar (September 2014). Ogden, Utah. "The Multiscale (Fracture) Mechanics & Materials Laboratory".
3. **Cornell University** - A Symposium in Honor of Professor Emeritus Anthony R. Ingraffea: Computer Simulation and Physical Testing of Complex Fracturing Processes (September 2014). Ithaca, New York. "Toward high-fidelity multi-scale modeling of 3D crack evolution".
2. **Lehigh University** - Seminars in Engineering Science, Department of Mechanical Engineering and Mechanics (March 2013). Bethlehem, Pennsylvania. "Recent advances in the characterization and simulation of crack evolution in 3D".
1. **University of Brescia** - Invited seminar in Dipartimento di Ingegneria Civile, Architettura, Territorio e Ambiente (June 2011). Brescia, Italy. "Predicting residual strength of damaged aircraft structures in real time: Surrogate modeling of high-fidelity fracture simulations".

CONFERENCE PRESENTATIONS (**presenter; student and post-doctoral advisees are underscored*)

92. J.N. Hirst*, B. Johnsson, B.R. Phung, J.-Y. He, B. Coats, **A.D. Spear**, "Predicting fall parameters of impact-induced skull fractures in infants using machine learning," *USNCCM,* Albuquerque, NM, July 2023.
91. E. Marsden*, B.R. Phung, D.S. Watring, **A.D. Spear**, "Predicting fracture location in AM tensile specimens with internal porosity and surface defects using a modified void descriptor function," *USNCCM*, Albuquerque, NM, July 2023.
90. K.P. Logakannan*, **A.D. Spear**, "Data-driven approach to predict location-dependent heat maps of fatigue performance in additively manufactured stainless steel 316L," *USNCCM,* Albuquerque, NM, July 2023.
89. V.B. Rao*, B.R. Phung, **A.D. Spear**, "Using deep learning to predict microstructurally small fatigue crack growth parameters in polycrystalline materials," *15th International Conference on Fracture (ICF15)*, Atlanta, GA, June 2023.
88. B.R. Phung*, D.A. Greeley, M. Yaghoobi, J.F. Adams, J.E. Allison, **A.D. Spear**, "Predicting microstructurally sensitive fatigue-crack path in WE43 magnesium using high-fidelity numerical modeling and three-dimensional experimental characterization," *15th International Conference on Fracture (ICF15)*, Atlanta, GA, June 2023.
87. C.K. Cocke, E. Marsden, B.R. Phung, V.B. Rao, L.C. Ziegler, **A.D. Spear***, "Predicting microstructure-sensitive fracture behavior in AM IN625 using a damage-enabled elasto-viscoplastic FFT framework," *15th International Conference on Fracture (ICF15)*, Atlanta, GA, June 2023.
86. **A.D. Spear***, C.K. Cocke, B.R. Phung, L. Ziegler, E. Marsden, V.B. Rao, "Predicting microstructure-sensitive fracture behavior in AM IN625 using a damage-enabled elasto-viscoplastic FFT framework," *TMS 2023 Annual Meeting & Exhibition*, San Diego, CA, March 2023. **Invited**
85. B.R. Phung*, D. Greeley, M. Yaghoobi, J. Allison, **A.D. Spear**, "Predicting microstructurally sensitive fatigue-crack path in WE43 magnesium sing high-fidelity numerical modeling and three-dimensional experimental characterization," *TMS 2023 Annual Meeting & Exhibition*, San Diego, CA, March 2023.
84. V.B. Rao, B.R. Phung*, B. Johnsson, **A.D. Spear**, "Accelerating microstructurally small crack growth predictions in three-dimensional microstructures using deep learning," *TMS 2023 Annual Meeting & Exhibition*, San Diego, CA, March 2023.
83. L. Ziegler*, C.K. Cocke, **A.D. Spear**, "Scaling microstructure-dependent mechanical properties to bulk material properties using 3D convolutional neural networks," *TMS 2023 Annual Meeting & Exhibition*, San Diego, CA, March 2023.
82. E. Marsden*, D.S. Watring, J. Erickson, L. Ziegler, A. Chuang, **A.D. Spear**, "Parameterizing surface efects and internal porosity to predict fracture location in as-built AM tensile specimens using a modified void descriptor function ," *TMS 2023 Annual Meeting & Exhibition*, San Diego, CA, March 2023.
81. **A.D. Spear***, "Predicting ductile failure in AM metals," *Computing in Engineering Forum 2022*, Virtual, September 2022. **Invited**
80. C.K. Cocke*, H. Mirmohammad, M. Zecevic, R.A. Lebensohn, O.T. Kingstedt, **A.D. Spear**, "Implementation and experimental validation of nonlocal damage in a large-strain elasto-viscoplastic FFT-

based model for predicting ductile failure in 3D polycrystalline materials," *WCCM 15*, Virtual, August 2022.

79. C.K. Cocke*, H. Mirmohammad, M. Zecevic, R.A. Lebensohn, O.T. Kingstedt, **A.D. Spear**, "Implementation and experimental validation of nonlocal damage in a large-strain elasto-viscoplastic FFT-based model for predicting ductile failure in 3D polycrystalline materials," *ESMC 11*, Galway, Ireland, July 2022.
78. C.K. Cocke*, H. Mirmohammad, M. Zecevic, R.A. Lebensohn, O.T. Kingstedt, **A.D. Spear**, "Implementation and experimental validation of nonlocal damage in a large-strain elasto-viscoplastic FFT-based model for predicting ductile failure in 3D polycrystalline materials," *3DMS 6*, Washington, D.C., June 2022.
77. D.S. Watring*, J.T. Benzing, O.L. Kafka, L.-.A Liew, N.H. Moser, J. Erickson, N. Hrabe, **A.D. Spear**, "Evaluation of an improved void descriptor function to uniquely characterize three-dimensional pore networks and to predict failure location in additively manufactured metals," *3DMS 6*, Washington, D.C., June 2022.
76. K.J. DeMille*, **A.D. Spear**, "Interpretation of convolutional neural networks for predicting volume requirements in studies of microstructurally small cracks", *TMS First World Congress on Artificial Intelligence in Materials & Manufacturing (AIM 2022)*, Pittsburgh, Pennsylvania, April 2022.
75. K.J. DeMille*, **A.D. Spear**, "Convolutional neural networks to expedite predictions of volume requirements in studies of microstructurally small cracks", *TMS 2022 Annual Meeting & Exhibition*, Anaheim, California, March 2022.
74. D.S. Watring*, J.T. Benzing, O.L. Kafka, L.-.A Liew, N.H. Moser, J. Erickson, N. Hrabe, **A.D. Spear**, "Predicting failure location in additively manufactured metals using an improved void descriptor function," *ASTM International Conference on Additive Manufacturing*, Anaheim, California, November 2021.
73. D.S. Watring*, J.T. Benzing, O.L. Kafka, L.-.A Liew, N.H. Moser, J. Erickson, N. Hrabe, **A.D. Spear**, "Predicting failure location in additively manufactured metals using an improved void descriptor function," *MS&T 21*, Columbus, Ohio, October 2021.
72. **A.D. Spear***, "Training deep-learning models with 3D microstructure images to predict location-dependent mechanical properties in additive manufacturing," *MS&T 21*, Columbus, Ohio, October 2021. **Invited**
71. C. Cocke*, A.D. Rollett, R. Lebensohn, **A.D. Spear**, "The AFRL AM Modeling Challenge: predicting micromechanical fields in AM IN625 using an FFT-based method with direct input from a 3D microstructural image," *USNCCM*, Virtual, July 2021.
70. K.J. DeMille*, **A.D. Spear**, "Interpretation of convolutional neural networks for predicting volume requirements in studies of microstructurally small cracks," *USNCCM*, Virtual, July 2021.
69. C. Herriott, **A.D. Spear***, "Predicting microstructure-dependent mechanical properties in additively manufactured metals using machine- and deep-learning methods", *USNCCM*, Virtual, July 2021.
68. D. Zhao*, K. Matheson, Q. Johnson, B. Phung, S. Petruzza, M. Czabaj, **A.D. Spear**, "Investigating the effect of grain structure on compressive response of open-cell metal foam using high-fidelity crystal-plasticity modeling", *USNCCM*, Virtual, July 2021.
67. B. Phung*, J.-Y. He, **A.D. Spear**, "A surface-mesh gradation tool for generating optimized tetrahedral meshes of microstructures with defects", *USNCCM*, Virtual, July 2021.
66. L. Wiesent*, U. Schultheiß. P. Lulla, T. Schratzenstaller, C. Schmid, A. Nonn, **A.D. Spear**, "Computational analysis of the effects of geometric irregularities and post-processing steps on the mechanical behavior of additively manufactured 316L stainless steel stents", *USNCCM*, Virtual, July 2021.
65. C. Cocke*, A.D. Rollett, R. Lebensohn, **A.D. Spear**, "The AFRL AM Modeling Challenge: predicting micromechanical fields in AM IN625 using an FFT-based method with direct input from a 3D microstructural image," *3DMS*, Virtual, June 2021.
64. C. Herriott, **A.D. Spear***, "Predicting microstructure-dependent mechanical properties in additively manufactured metals using machine- and deep-learning methods", *3DMS*, Virtual, June 2021.

63. B. Phung*, J.-Y. He, **A.D. Spear**, "A surface-mesh gradation tool for generating optimized tetrahedral meshes of microstructures with defects", *3DMS*, Virtual, June 2021.
62. Q. Johnson, J. Plumb, P. Kenesei, H. Sharma, J. Park, **A.D. Spear***, "3D characterization of grain structure and in-situ deformation of open-cell metal foam using micro-computed tomography and high-energy X-ray diffraction microscopy", *3DMS*, Virtual, June 2021.
61. K.J. DeMille*, **A.D. Spear**, "Expediting the determination of representative volume elements for small cracks through the use of convolutional neural networks", *14th World Congress in Computational Mechanics*, Virtual Congress, January 2021.
60. D. Watring*****, J.T. Benzing, N. Hrabe, **A.D. Spear**, "Processing-structure-property relationships in as-built laser powder bed fused Inconel 718", *ASTM International Conference on Additive Manufacturing*, Virtual, November 2020.
59. **A.D. Spear***, "Predicting microstructurally small crack growth in 3D by integrating experimental data, physics-based modeling, and machine learning," *Symposium on Applications of Machine Learning and Scalable Image Informatics to Materials Discovery (NSF Ideas^2 Program)*, Santa Barbara, California, February 2020. **Invited**
58. A. Rahman*, and **A.D. Spear**, "Tailoring carbon nanotube-polymer interface using a combined molecular dynamics/machine learning approach," *Symposium on Applications of Machine Learning and Scalable Image Informatics to Materials Discovery (NSF Ideas^2 Program)*, Santa Barbara, California, February 2020. **Invited poster**
57. Q. Johnson*, K.E. Matheson, J. Plumb, P. Kenesei, H. Sharma, J.-S. Park, **A.D. Spear**, "3D in-situ characterization of the deformation of open-cell aluminum foam using high energy x-ray diffraction microscopy and micro-computed tomography", *TMS 2020 Annual Meeting & Exhibition*, San Diego, California, February 2020.
56. K.J. DeMille*, **A.D. Spear**, "Determination of representative volume elements for small cracks in heterogeneous domains via convolutional neural networks", *TMS 2020 Annual Meeting & Exhibition*, San Diego, California, February 2020.
55. A. Rahman*, P. Deshpande, M. Radue, M. Czabaj, S. Gowtham, S. Ghosh, G. Odegard, **A.D. Spear**, "Designing high-strength carbon-nanotube polymer composites using machine learning algorithms with molecular dynamics simulations," *TMS Annual Meeting 2020*, San Diego, California, February 2020.
54. K. Pierson, A. Rahman, and **A.D. Spear***, "Predicting microstructure-sensitive fatigue-crack path in 3D using a machine learning framework," *TMS Annual Meeting 2020*, San Diego, California, February 2020.
53. J. Erickson*, **A.D. Spear**, A. Rahman, "Predicting crack location using a radial distribution function as a unique descriptor of pore networks," *TMS Annual Meeting 2020*, San Diego, California, February 2020.
52. D. Zhao*, K.E. Matheson, B.R. Phung, M.W. Czabaj, **A.D. Spear**, "A crystal plasticity modeling framework to study the effect of grain size on mechanical response of open-cell aluminum foam", *TMS 2020 Annual Meeting & Exhibition*, San Diego, California, February 2020.
51. N. Kouraytem*, X. Li, R. Cunningham, C. Zhao, A.D. Rollett, T. Sun, **A.D. Spear**, W. Tan. "Effect of laser-matter interaction on molten pool flow and keyhole dynamics", *TMS 2020 Annual Meeting & Exhibition*, San Diego, California, February 2020. (poster)
50. D. Watring*, J. Benzing, N. Hrabe, **A.D. Spear**, "Effects of laser-energy density and build orientation on the defect structure, microstructure, and tensile properties of laser powder bed fused Inconel 718", *TMS 2020 Annual Meeting & Exhibition*, San Diego, California, USA, February 2020. (student poster)
49. K.J. DeMille*, **A.D. Spear**, "Determination of Representative Volume Elements for Small Cracks Using Finite-Element Modeling Combined with Machine Learning", *International Mechanical Engineering Congress & Exposition (IMECE)*, Salt Lake City, Utah, November 2019.
48. N. Kouraytem*, R.A. Chanut, T. Loveless, D.S. Watring, **A.D. Spear**, O.T. Kingstedt. "Effect of intra-build location, loading direction, and direct age hardening heat-treatment on quasi-static and dynamic response of additively manufactured Inconel 718 volume". *International Mechanical Engineering Congress and Exposition (IMECE)*, Salt Lake City, Utah, November 2019.
47. D. Watring*, K. Carter, D. Crouse, B. Raeymaekers, **A.D. Spear**, "Effects of processing parameters and surface roughness on the high-cycle fatigue life of Inconel 718 manufactured by laser powder bed fusion",

International Mechanical Engineering Congress & Exposition (IMECE), Salt Lake City, Utah, November 2019.

46. J. He*, J. Yan, S. Margulies, B. Coats, **A.D. Spear**, "An adaptive-remeshing framework to predict impact-induced skull fracture in infants", *International Mechanical Engineering Congress and Exposition (IMECE)*, Salt Lake City, Utah, November 2019.
45. J. Yan*, J. He, **A.D. Spear**, B. Coats. "The effect of impact angle and height on skull fracture patterns in infants", *International Mechanical Engineering Congress and Exposition (IMECE)*, Salt Lake City, Utah, November 2019.
44. D. Watring*, J.T. Benzing, N. Hrabe, **A.D. Spear**, "Effects of laser-energy density and build orientation on defect structure, microstructure, and tensile properties of laser powder bed fused Inconel 718", *4th ASTM Symposium on Structural Integrity of Additive Manufactured Materials and Parts*, Oxon Hill, Maryland, October 2019.
43. T. Loveless*, N. Kouraytem, R.A. Chanut, D.S. Watring, **A.D. Spear**, O.T. Kingstedt. "Location and orientation specific mechanical response of AM Inconel 718". *4th ASTM Symposium on Structural Integrity of Additive Manufactured Materials & Parts (Student Presentations Competition)*, Oxon Hill, Maryland, October 2019.
42. D. Watring*, K. Carter, D. Crouse, **A.D. Spear**, "Effects of laser processing parameters and build orientation on the surface roughness and highcycle fatigue life of Inconel 718 manufactured using laser powder bed fusion", *Materials Science and Technology (MS&T) 2019*, Portland, Oregon, USA, October 2019.
41. N. Kouraytem*, R.A. Chanut, D.S. Watring, O.T. Kingstedt, **A.D. Spear**. "Effect of intra-build location and loading direction on quasi-static and dynamic response of additively manufactured Inconel 718. *MS&T19*, Portland, Oregon, October 2019.
40. C. Herriott, X. Li, N. Kouraytem*, V. Tari, W. Tan, B. Anglin, A.D. Rollett, **A.D. Spear**, "A multi-scale, multi-physics modeling framework to predict spatial variation in additive-manufactured metals", *15th U.S. National Congress on Computational Mechanics (USNCCM)*, Austin, Texas, August 2019.
39. D. Zhao*, J. Tucker, **A.D. Spear**, "High-fidelity numerical simulation of open-cell aluminum foams using crystal plasticity modeling", *11th International Conference on Porous Metals and Metallic Foams (MetFoam)*, Dearborn, Michigan, August 2019.
38. Q. Johnson*, J. Plumb, K. Matheson, P. Kenesei, H. Sharma, **A.D. Spear**, "3D characterization of an open-cell aluminum foam under compression test with combined in-situ high-energy x-ray computed tomography and diffraction microscopy", *11th International Conference on Porous Metals and Metallic Foams (MetFoam)*, Dearborn, Michigan, August 2019.
37. J. Tucker*, **A.D. Spear**, "A tool to generate representative grain-resolved open-cell foam models", *5th World Congress on Integrated Computational Materials Engineering (ICME)*, Indianapolis, Indiana, July 2019.
36. **A.D. Spear***, "Data-driven materials science: Successes, challenges, and opportunities", *TMS Annual Meeting and Exhibition*, San Antonio, Texas, March 2019. **Young Professionals Luncheon Lecture**
35. **A.D. Spear***, D.S. Watring, N. Kouraytem, "A data-driven approach to investigate the influence of process parameters on fatigue life of additively manufactured metals", *TMS Annual Meeting and Exhibition*, San Antonio, Texas, March 2019. **Invited**
34. A. Rahman*, M.S. Radue, G.M. Odegard, M.W. Czabaj, **A.D. Spear**, "Designing high-strength carbon-nanotube composites using reinforcement learning algorithms integrated with molecular dynamics simulations", *TMS Annual Meeting and Exhibition*, San Antonio, Texas, March 2019.
33. N. Kouraytem*, C. Herriott, X. Li, W. Tan, V. Tari, B. Anglin, A.D. Rollett, **A.D. Spear**, "Site-specific property maps of additively manufactured SS316L using a mesoscale, multi-physics modeling framework", *TMS Annual Meeting and Exhibition*, San Antonio, Texas, March 2019.
32. N. Kouraytem*, X. Li, R. Cunningham, C. Zhao, A.D. Rollett, T. Sun, **A.D. Spear**, W. Tan, "In-situ dynamic x-ray radiography combined with multi-physics numerical modeling to elucidate laser-induced keyhole dynamics in SS304", *TMS Annual Meeting and Exhibition*, San Antonio, Texas, March 2019.

31. A. Rahman*, M.S. Radue, G.M. Odegard, M.W. Czabaj, P. Deshpande, **A.D. Spear**, "Designing high-strength carbon-nanotube polymer composites using reinforcement learning algorithms integrated with molecular dynamics simulations", *American Physical Society (APS)*, Boston, Massachusetts, March 2019.
30. N. Kouraytem*, R. Chanut, O. Kingstedt, **A.D. Spear**, "Investigation of variability of dynamic response and effect of heat treatment of laser powder bed fusion Inconel 718", *ASME IMECE*, Pittsburgh, Pennsylvania, November 2018.
29. B.R. Phung, J. Adams, J. Allison, S.F. Li, J. Lind, **A.D. Spear***, "Multiscale characterization and modeling of 3D crack propagation in polycrystalline materials", *Society of Engineering Sciences (SES)*, Madrid, Spain, October 2018. **Invited**
28. C. Herriott*, X. Li, V. Tari, N. Kouraytem, W. Tan, B. Anglin, A.D. Rollett, **A.D. Spear**, "Site-specific property maps of additively manufactured (AM) metals using a mesoscale, multi-physics modeling framework", *13th World Congress on Computational Mechanics*, New York, July 2018.
27. D. Zhao*, J. Plumb, B.R. Phung, K. Matheson, J. Guilkey, **A.D. Spear**, "3D crystal-plastic particle-in-cell simulation of open-cell metal foam", *13th World Congress on Computational Mechanics*, New York, July 2018.
26. C. Herriott, X. Li, V. Tari, N. Kouraytem, W. Tan, B. Anglin, A.D. Rollett, **A.D. Spear***, "Site-specific property maps of additively manufactured (AM) metals using a mesoscale, multi-physics modeling framework", *3DMS*, Elsinore, Denmark, June 2018.
25. J.C. Plumb, J.F. Lind, J.C. Tucker, R. Kelley, **A.D. Spear***, "3D grain mapping of open-cell aluminum foam by synthetic-data fusion with experimental data from HEDM", *3DMS*, Elsinore, Denmark, June 2018. **Invited**
24. K. DeMille*, **A.D. Spear**, "Determination of representative volume elements for small cracks in heterogeneous domains", *Engineering Mechanics Institute*, Boston, Massachusetts, May 2018.
23. **A.D. Spear***, "A data-driven approach to predict microstructurally small fatigue-crack evolution", *TMS Annual Meeting and Exhibition*, Phoenix, Arizona, March 2018. **Invited**
22. B.R. Phung*, **A.D. Spear**, "A voxel-based meshing framework for the simulation of arbitrary 3D crack growth in heterogeneous materials", *TMS Annual Meeting and Exhibition*, Phoenix, Arizona, March 2018.
21. **A.D. Spear***, "On the interaction of 3D crack surfaces with grain boundaries in polycrystalline materials", *Materials Research Society (MRS) Fall Meeting*, Boston, Massachusetts, November 2017. **Invited**
20. D. Zhao*, J. Plumb, **A.D. Spear**, "Characterization and role of interfaces in stochastic open-cell metal foams", *Materials Research Society (MRS) Fall Meeting*, Boston, Massachusetts, November 2017. (student poster)
19. B.R. Phung*, **A.D. Spear**, "A voxel-based meshing framework for the simulation of arbitrary 3D crack growth in heterogeneous materials", *International Conference on Fracture (ICF 14)*, Rhodes, Greece, June 2017.
18. K.J. DeMille*, **A.D. Spear**, "Establishment of representative volume elements for the analysis of microstructurally small cracks in polycrystalline materials", *International Conference on Fracture (ICF 14)*, Rhodes, Greece, June 2017.
17. N. Wilkinson, K. Pierson, P.T. Fletcher, J.D. Hochhalter, **A.D. Spear***, "Toward the use of machine learning to predict microstructurally small fatigue crack evolution", *TMS Annual Meeting and Exhibition*, San Diego, California, February 2017.
16. B.R. Phung*, B. Leavy, R. Brannon, **A.D. Spear**, "A comparison between the finite element method and material point method in mesoscale crystal plasticity simulations", *Engineering Mechanics Institute*, Nashville, Tennessee, May 2016.
15. **A.D. Spear***, J.D. Hochhalter, A.R. Cerrone, A.R. Ingraffea, "Generation of conformal finite-element meshes from 3D measurements of microstructurally small fatigue-crack propagation", *Engineering Mechanics Institute*, Nashville, Tennessee, May 2016.
14. **A.D. Spear***, J.D. Hochhalter, A.R. Cerrone, S.F. Li, J.F. Lind, R.M. Suter, A.R. Ingraffea, "Multiscale simulation of observed 3D crack evolution in a polycrystalline aluminum alloy", *13th U.S. National Congress on Computational Mechanics*, San Diego, California, July 2015.

13. **A.D. Spear***, J.D. Hochhalter, A.R. Cerrone, S.F. Li, J.F. Lind, R.M. Suter, A.R. Ingraffea, "Combined multi-scale characterization and modeling of 3D fatigue-crack evolution in an aluminum alloy", *ASME Applied Mechanics and Materials Conference (McMAT2015)*, Seattle, Washington, June 2015.
12. **A.D. Spear***, J.D. Hochhalter, S.F. Li, J.F. Lind, R.M. Suter, A.R. Ingraffea, "3-D concurrent multiscale modeling of microstructurally small fatigue-crack evolution in an aluminum alloy from synchrotron-based measurements", *TMS Annual Meeting and Exhibition*, Orlando, Florida, March 2015. **Invited**
11. **A.D. Spear***, J.D. Hochhalter, A.R. Cerrone, S.F. Li, J.F. Lind, R.M. Suter, A.R. Ingraffea, "3D digital reconstruction and numerical modeling of microstructurally small fatigue cracks in an aluminum alloy from synchrotron-based measurements", *7th International Conference on Multiscale Materials Modeling*, Berkeley, California, October 2014.
10. **A.D. Spear***, S.F. Li, A.R. Cerrone, J.F. Lind, R.M. Suter, A.R. Ingraffea, "3D microscale characterization and crystal-plastic FE simulation of fatigue-crack nucleation and propagation in an aluminum alloy", *The Materials Science & Technology Conference*, Montreal, Canada, October 2013.
9. A.R. Cerrone*, **A.D. Spear**, J. Tucker, C. Stein, A.D. Rollett, A.R. Ingraffea, "Modeling crack nucleation at coherent twin boundaries in nickel-based superalloys", *The Materials Science & Technology Conference*, Montreal, Canada, October 2013.
8. **A.D. Spear***, S.F. Li, J. Lind, R.M. Suter, A.R. Cerrone, J.D. Hochhalter, A.R. Ingraffea, "Microstructurally small fatigue cracking in an Al-Mg-Si alloy: Experiments and modeling", *TMS Annual Meeting and Exhibition*, San Antonio, Texas, March 2013. **Awarded Best Student Presentation in symposium**
7. A.R. Cerrone*, J.C. Tucker, C. Stein, **A.D. Spear**, A.R. Rollett, A.R. Ingraffea, "Characterizing and simulating fatigue cracking mechanisms in LSHR", *TMS Annual Meeting and Exhibition*, San Antonio, Texas, March 2013.
6. J.D. Hochhalter*, V.K. Gupta, V.I. Yamakov, **A.D. Spear**, S.W. Smith, E.H. Glaessgen, "In-situ measurements and simulations of grain boundary slip localization in AlCu", *TMS Annual Meeting and Exhibition*, San Antonio, Texas, March 2013.
5. V.K. Gupta*, J.D. Hochhalter, E. Saether, S. Willard, **A.D. Spear**, T. Wallace, S.W. Smith, E.H. Glaessgen, "High-resolution image correlation, EBSD-based characterization and simulation of crack tip and grain boundary deformation in Al-Cu alloys", *TMS Annual Meeting and Exhibition*, San Antonio, Texas, March 2013.
4. **A.D. Spear***, A.R. Ingraffea, "Microstructurally small fatigue crack initiation and growth in (ultra)thin COPV-liner material", *11th International Conference on the Mechanical Behavior of Materials*, Lake Como, Italy, June 2011.
3. **A.D. Spear***, M.G. Veilleux, J.E. Bozek, A.R. Ingraffea, "Structural assessment and prognosis using a multiscale fracture mechanics-based approach", *2010 Aircraft Airworthiness & Sustainment Conference*, Austin, Texas, May 2010.
2. **A.D. Spear***, J.D. Hochhalter, A.R. Ingraffea, "Simulation of discrete-source damage growth in aircraft structures: A 3D finite element modeling approach", *12th International Conference on Fracture*, Ottawa, Canada, 2009.
1. J.D. Hochhalter*, **A.D. Spear**, A.R. Ingraffea, "Crack trajectory prediction in thin shells using finite element analysis", *6th International Conference on Computation of Shells & Spatial Structures*, Ithaca, New York, 2008.