DR. MATTHEW S. ALLEN

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PROFESSIONAL EXPERIENCE

Brigham Young University, *Professor* 2021 – present
Mechanical Engineering Department
University of Wisconsin-Madison, *Professor, Engineering Physics Dept.* 2019 – 2021
University of Wisconsin-Madison, *Associate Professor, EP Dept.* 2013 – 2019
University of Wisconsin-Madison, *Assistant Professor, EP Dept.* 2007 – 2013
Sandia National Laboratories, *Postdoctoral Appointee* 2005 – 2006
Georgia Institute of Technology, *Graduate Research Assistant* 2001 – 2005

EDUCATION

Atlanta, Georgia **Georgia Institute of Technology** 2001 – 2005
Ph.D./M.S. in Mechanical Engineering: GPA 4.0/4.0.

- Ph.D. Thesis: "Global and Multi-Input-Multi-Output (MIMO) Extensions of the Algorithm of Mode Isolation (AMI)" **Advisor:** Dr. Jerry H. Ginsberg
- Doctorate degree received May 7, 2005.

Provo, Utah **Brigham Young University** 1994 – 95, 98 – 2001
B.S. in Mechanical Engineering: Magna Cum Laude

- Research in Vibrations, Materials Science and Heat Transfer.

RESEARCH EXPERIENCE

Brigham Young University, *Professor, Mechanical Eng. Dept.* 2021 – present

Dr. Allen has been the principal investigator on over $5.0M of funded research ($7.3M if funds expended by others are included). Major projects are listed below and some results are highlighted. Amounts are all the funds expendable by Allen except as noted.

CURRENT/PENDING PROJECTS

- "Prediction of Damping and Nonlinearity in Finger Seal Joints," PI, Pratt & Whitney, 2024-2025, $79,982.76. R0602733
- "Characterizing the Damping and Nonlinearity in Riveted Joints," PI, Pratt & Whitney, 2023-2025, $161,000. R0602719
- "Education and Foundational Research in Dynamic Substructuring – Yr 2," PI with co-PI Dr. Jeff Hill, Sandia National Laboratories, 2025, $48,000, (Allen's share of the $80,000 award). AW02022
- "2024 Continuation: Influence of Boundary Conditions in Smart Environmental Testing," PI, Kansas City National Security Campus, 2025-2026, $25,000. AW02143

- "Models for Material Damping of Powders in Additively Manufactured Metal Parts," co-PI with Jeff Hills & Nathan Crane, National Science Foundation, ~$220,000 (Allen's share of $517,076 award). R0112552

OTHER PROJECTS

- Invited to be a member of the NASA Engineering and Safety Center (NESC) Loads and Dynamics Technical Discipline Team.
  - Supported work to evaluate the effect of nonlinearities within the Multi-Purpose Crew Vehicle (MPCV).
  - Proposed an augmentation method that will estimate the fixed-interface modes of the SLS from test measurements in the Vehicle Assembly Building (VAB).
  - Supported efforts to construct forcing functions for NASA Space Launch System (SLS) during roll-out.

PAST PROJECTS

- "2024 Continuation: Influence of Boundary Conditions in Smart Environmental Testing," PI, Kansas City National Security Campus, 2024-2025, $50,000. R0303271
- "KCNSC-RJ - Methods for Predicting and Measuring the Nonlinear Response of Components," PI, Kansas City National Security Campus, 2024-2025, $125,000. R0303272
- "2024 Continuation: Influence of Boundary Conditions in Smart Environmental Testing," PI, Kansas City National Security Campus, 2023-2024, $100,000. R0303215
- "KCNSC-RJ - Methods for Predicting and Measuring the Nonlinear Response of Components," PI, Kansas City National Security Campus, 2023-2024, $99,910. R0303216
- "Education and Foundational Research in Dynamic Substructuring," PI with co-PI Dr. Jeff Hill, Sandia National Laboratories, 2024, $60,000, (Allen's share of the $80,000 award). R0303219
- "Continuation: Influence of Boundary Conditions in Smart Environmental Testing," PI, Kansas City National Security Campus, 2022-2023, $90,000. R0303130
- "Continuation: Amplitude Dependent System Identification with Modal Coupling," PI, Sandia National Laboratories, 2022-2023, $75,000. R0303141
- "Influence of Boundary Conditions in Smart Environmental Testing," PI, Kansas City National Security Campus, 2021-2022, $135,000. R0303030, R0303090
- "Amplitude Dependent System Identification with Modal Coupling," PI, Sandia National Laboratories, 2021-2022, $75,058. R0303048
- "Drop Testing for Medical Devices," PI, Nu Skin Enterprises Inc, 2022, $11,058. R0602685

University of Wisconsin-Madison, *Engineering Physics Dept.* 2019 – 2021

PAST PROJECTS

- "Noninvasive assessment of in vivo tissue loads to enhance the treatment of gait disorders," PI-Thelen, CIs-Allen, Schwartz, Novacheck & Ledoux, *National Institutes of Health*, 2017-2022, $123k, (Allen's estimated share, the total budget is approx $1.8M).
- "Extending a Smart Environmental Test Approach," PI, Kansas City National Security Campus, 2020-2021, $49,000.
- "Extension to Spidered Representations for Linear and Nonlinear Contact at Bolted Joints (year 4)," PI, Sandia National Laboratories, 2020-2021, $75,000.
- "System ID for Nonlinear Systems," PI, Sandia National Laboratories, 2020-2021, $75,000.
- "MRI: Acquisition of a Multipoint Laser Vibrometer for Studying Multiscale and Nonstationary Dynamics of Materials and Complex Structures," *co-PI*, *National Science Foundation*, 2017-2020, $155k (Allen's estimated share, the total budget is $470,250 plus $100k UW-Madison cost share).
- "Testing And Model Updating For Geometrically Nonlinear Hypersonic Vehicle Assemblies Using Nonlinear Normal Modes," PI, *Air Force Office of Scientific Research, 2017-2020,* $455,793
- "New Nonlinear Modal Analysis Framework for Multi-Scale Modeling of Structures with Bolted Interfaces," co-PI, *National Science Foundation*, 2016-2018, $332,000
- "Extension to Spidered Representations for Linear and Nonlinear Contact at Bolted Joints," *PI, Sandia National Laboratories, 2018-2020, $147,000.*
- "Exploring Methods for Implementing Experimental Modal Models in Abaqus," *PI, Sandia National Laboratories, 2018-2020, $150,000.*
- "Multi-Input-Multi-Output (MIMO) Active Vibration Control (year 4)," *PI, Kansas City National Security Campus, 2018-2020, $151,000.*
- "Linear and Nonlinear Exploration of Spidered Representations for Contact at Bolted Joints," *PI, Sandia National Laboratories, 2017-2018, $70,000.*
- "Multi-Input-Multi-Output (MIMO) Active Vibration Control (year 2)," *PI, Kansas City National Security Campus, 2017-2018, $90,000.*
- "Experimental-Analytical Substructuring To Characterize Nonlinear Response Of Environmental Tests Systems," *PI, Kansas City National Security Campus, 2017-2018, $80,000.*
- "A New Benchmark Structure for Measuring and Predicting Nonlinear Joint Behavior," *PI, Sandia National Laboratories, 2016-2017, $36,609*
- "Multi-Input-Multi-Output (MIMO) Active Vibration Control," *PI, Kansas City National Security Campus, 2016-2017, $122,273*
- "Experimental Shaker Substructuring," *PI, Kansas City National Security Campus, 2016-2017, $40,000*
- "Nonlinear Substructuring with Weakly Nonlinear Joints," *co-PI, Sandia National Laboratories, 2015-2016, $80,000*
- "Structural Dynamic Output Metrics," *PI, Sandia National Laboratories, 2015-2016, $65,683*
- "Identification of Nonlinear Substructure Models," *co-PI, Sandia National Laboratories, 2014-2015, $56,000*

- "Tools to Enable Industrial Application of Experimental Substructuring with Craig Bampton Models," *co-PI, Sandia National Laboratories, 2013-2014, $82,000*
- "Advanced Bases for the Transmission Simulator method of Experimental-Analytical Substructuring," *co-PI, Sandia National Laboratories, 2012-2013, $35,000*
- "Evaluation of CSLDV for Force Reconstruction at Bolted Interfaces," *PI, Sandia National Laboratories, 2012-2013, $10,000*
- "Exploring the Effect of Uncertainty on Experimental / Analytical Substructuring Predictions," *co-PI, Sandia National Laboratories, 2011-2012, $35,000*
- "Metrics for Diagnosing Negative Mass in Experimental/Analytical Substructuring," *co-PI, Sandia National Laboratories, 2010-2011, $45,000*
- "Substructuring with Nonlinear Subcomponent Models Based on Nonlinear Normal Modes with Application to Hypersonic Vehicle Design," *PI, Young Investigator Program, Air Force Office Of Scientific Research, Program Manager: David Stargel, 2011-2014, $364,180*
    - Studying nonlinear vibration of assemblies of subcomponents and strategies for extracting nonlinear models from finite element codes. The project aims to facilitate the design of hypersonic vehicle skin panels.
- "Method for Experimental Identification of Nonlinear Dynamic Systems of Unknown Form and Order with Application to Human Gait," *PI, National Science Foundation, Program Manager: Eduardo Misawa, 2010-2013, $279,982*
    - Developing system identification technique that determines the order, model form and parameters of nonlinear dynamic systems by approximating them as linear time-periodic over a certain limit cycle.
    - These methods are being used to seek to obtain a better understanding of neuro-muscular function in human gait.
- "Develop Process to Estimate the Noise Floor of Various Torsional Vibration Sensors," *PI, Cummins Power Generation, 2010, $29,620*
- "Experimental/Analytical Substructuring under Uncertainty," *co-PI, Sandia National Laboratories, 2009-2010, $46,151*
- "Coupling/Uncoupling of Field and Laboratory Structures and Modal Substructure Expansion," *co-PI, Sandia National Laboratories, 2008-2009, $30,002*
- Continuous Scan Laser Doppler Vibrometry, Supported by University of Wisconsin-Madison Startup Funds
- "Stochastic Analysis of Test Analysis Model (TAM) Correlation for Aircraft," *PI, Air Force Office of Scientific Research, 2008, ~$15k*
- "Stochastic Analysis of Test-Analysis Models," *PI, supported by Sandia National Laboratories, 2007-2008, $21,888*
- "Characterization of Nonlinear Microsystems using Laser Doppler Vibrometer (LDV) Measurements," *PI, Sandia National Laboratories, 2007-2008, $26,330*
    - Discovered previously unmodeled effects that can cause atomic force microscope calibration to be in error by more than 100%. Developing approaches to correct for these errors, enabling accurate force measurement in nano-scale systems.
- "Experimental/Analytical Substructure Coupling," *PI, Sandia National Laboratories, 2007-2008, $21,888*

- Enabled more accurate and efficient modeling of structures composed of subsystems by developing the Modal Constraints for Fixture and Subsystem (MCFS) method of connecting subcomponent models, which reduces the sensitivity of coupled system predictions to experimental errors.
- This work enabled us to predict the response of a complicated structure made up of subcomponents that join through a statically indeterminate multi-point connection.

Sandia National Laboratories, *Postdoctoral Appointee* 2005 – 2006

- Nonlinear Vibration
  - Developed method to characterize nonlinear response of micro-cantilevers to support squeeze film damping modeling efforts.
  - Investigated time-domain methods for detecting nonlinearity in transient (shock) response data.
- Uncertainty Quantification and Model Validation
  - Optimized control waveforms for radio-frequency micro-electro mechanical switches with uncertain physical parameters.
  - Developed methods for modeling the response of nonlinear dynamic systems to nonstationary, non-Gaussian input.
  - Evaluated techniques for modeling dynamic systems with stochastic parameters using finite element models. Methods studied include Latin Hypercube Sampling, reliability methods (FORM/SORM) and stochastic finite elements. (Joint effort with Lockheed Martin)
  - Explored new methods for validating models in the presence of variability, ignorance, and incomplete information.
- Force Reconstruction and Admittance Modeling
  - Developed new time domain methods for identifying the forces acting on a structure from response measurements. Compared these and existing methods to classical frequency domain techniques.
  - Characterized uncertainty and experimental issues in admittance modeling for automobiles. Joint project between SNL and Goodyear.

Georgia Institute of Technology 2001 – 2005

- Experimental Modal Analysis (EMA), Vibrations
  - Created a global Multi-Input-Multi-Output (MIMO) extension to the Algorithm of Mode Isolation (AMI). The resulting algorithm estimates the natural frequencies, damping ratios and mode shapes of vibratory systems from experimentally measured vibration data in the presence of significant measurement noise, as may be present in damage detection or condition monitoring applications.
  - Applied AMI algorithms to detect damage and manufacturing defects in computer chips ("flip-chips") and timber highway-bridge pilings.
  - Incorporated concepts from nonlinear optimization into MIMO-AMI. Careful attention to computational efficiency resulted in an algorithm that is capable of

quickly processing data from hundreds of input – output combinations simultaneously.
    - Investigated systems with close natural frequencies, mode localization and high noise and applied knowledge of the vibratory phenomena to algorithm development.
    - Studied and applied advanced signal processing and statistical concepts such as bias error in spectral and frequency response function estimation, confidence intervals, etc…
- Controls, Dynamic Systems
    - Implemented modern system identification algorithms such as the Stochastic Subspace (SSI) and pLSCF (or Polymax®) algorithms and found the extensions of AMI to compare favorably with these.

Patterned Fiber Composites, Lindon, UT 2000 – 2001

- Testing of Composite Materials, Design of Composite Structures, Finite Element Analysis (FEA), Damping, Vibrations
    - Found that time-temperature superposition could be applied to damped wavy composite materials and implemented frequency/temperature testing, greatly increasing our understanding of how wavy composite materials perform.
    - Helped in developing a novel dynamic testing apparatus with temperature control for carbon-fiber composite materials that exhibit extremely high damping.
    - Designed highly damped composites for aerospace and sporting goods applications. (See our golf club at www.nr-golf.com. The "Wright Flyer" replica airplane, featured on the Discovery Channel, also used these materials http://wrightflyer.usurf.usu.edu/)
    - Performed FEA simulations and correlated FEA results to test data.
    - Designed structural modifications to manufacturing equipment.

Center for Advanced Friction Studies, Carbondale, IL Summer 1999

- Materials Science: Carbon/Carbon Composites, Heat Transfer
    - Worked in research of Carbon/Carbon fiber composites graphitized using a chemical vapor deposition technique (CVD) for use as friction materials in aircraft braking systems.

TEACHING

Brigham Young University 2021 – present

- System Dynamics (ME EN 335)
- Kinematics (ME EN 437)
- Aerospace Structural Dynamic Testing and System Identification (ME EN 531)
    - Junior-Senior level course concerned with experimental techniques for dynamic systems including experimental modal analysis, operational modal analysis, vibration sensors (e.g. accelerometers, laser vibrometers, strain gauges, etc…)
- Mechanical Vibrations (ME EN 535)
- Coach for: Capstone (ME EN 475-476)

University of Wisconsin-Madison 2007 – 2021

- Vibrations of Mechanical Systems (EMA/EP/ME 545)
  - Vibrations of linear single and multi-degree of freedom systems, Lagrange's equations, modal analysis, Ritz method for continuous systems, etc…
  - Text: "Mechanical and Structural Vibrations," Jerry H. Ginsberg, 2001.
- Experimental Vibrations (EMA/ME 540)
  - Junior-Senior level course concerned with experimental techniques for dynamic systems including experimental modal analysis, operational modal analysis, vibration sensors (e.g. accelerometers, laser vibrometers, strain gauges, etc…)
- Advanced Dynamics (EMA/ME 542)
  - Junior-Senior level course covering 3D rigid body dynamics including Moving/Rotating reference frames, Euler's equations, etc…
  - Text: "Advanced Dynamics," 3rd ed. Jerry H. Ginsberg, 2008.
- Nano-Mechanics (EMA 615) co-taught with Prof. Wendy Crone.
  - Applications of mechanics and materials to nanoscale and MEMS systems
  - Taught modules on Atomic Force Microscopy (AFM), uncertainty analysis in MEMS, dynamics applications and thermal vibration in MEMS and AFM.
- Structural Finite Element Model Validation (EMA 610)
  - Advanced topics in structural dynamics including finite element types and their impact on the accuracy of predicted natural frequencies and substructuring methods such as Guyan reduction and the Hurty/Craig-Bampton Method.
  - Finite element model correlation and updating methods
- Satellite Dynamics (EMA 642)
  - Advanced dynamics of 3D rigid bodies, Lagrange's Equations using constrained generalized coordinates, attitude control methods for satellites, etc…
- Nonlinear and Random Mechanical Vibrations (EMA 745)
  - Review of analytical methods for nonlinear dynamic systems: perturbation methods, harmonic balance, averaging
  - Numerical methods including nonlinear normal mode computation methods, multi-harmonic balance and reduced order modeling of finite element models

AWARDS RECEIVED

- B. J. Lazan Award from the Society for Experimental Mechanics, Feb. 2023.
- Dominick J. DeMichele Award from the Society for Experimental Mechanics, Feb. 2022.
- NASA NESC Group Achievement Award, "Improved Model Correlation and Identification of Non-Linear Joints Applicable to the MPCV Team, Oct 8, 2019.
- Young Investigator Award, Air Force Office of Scientific Research (AFOSR), 2011.
- ASEE/AFOSR Summer Faculty Research Associate, WPAFB, 2008.
- National Science Foundation (NSF) Graduate Research Fellowship – 2002
- Best Student Paper Award, 148th Meeting of the Acoustical Society of America, 2004.
- Achievement Rewards for College Scientists (ARCS) Fellowship – 2003
- Georgia Tech George W. Woodruff Fellowship – 2001

- Georgia Tech Presidential Fellowship – 2001
- Academic Scholarship from Brigham Young University – 1998
- Elected to Tau Beta Pi, Phi Kappa Phi & Golden Key Honor Societies.
- Eagle Scout Award from the Boy Scouts of America – 1993

PROFESSIONAL ASSOCIATIONS

- Society for Experimental Mechanics (SEM)
- American Society of Mechanical Engineers (ASME)
- American Institute of Astronautics and Aeronautics (AIAA)
- Acoustical Society of America (ASA)

SERVICE TO PROFESSIONAL ASSOCIATIONS

- Conference Director, SEM International Modal Analysis Conference, 2024-2027.
- Chair, Advisory Board, SEM International Modal Analysis Conference, 2021-2024.
- Chair of the SEM Dynamic Substructuring Technical Division, which plans conference activities and coordinates research for approximately 50 interested researchers (Member 2012-2018, Vice Chair 2018-2020, Chair 2020-2023, Past Chair 2023-2025).
- Advisory Board member for the SEM International Modal Analysis Conference (2012-2020,2021-present). (formerly a member of the Future Conference Committee)
- Associate Editor, Experimental Mechanics (SEM's Flagship Journal), (2023-present).
- Associate Editor, Experimental Techniques (SEM Journal), (2019-2023).
- Involved in the organization of the International Modal Analysis Conference (2009-present). Organize and chair at least one session per year.
- Member of the Society for Experimental Mechanics (SEM) Executive Committee, (2017-2020).
- Regularly chair sessions at the AIAA Structural Dynamics and Materials (SDM) Conference / AIAA-SciTech and at the ASME International Design Engineering Technical Conference (IDETC).
- Member of the Structural Dynamic Technical Division of AIAA, (2010-2014).
- Member of the ASME Technical Committee on Vibration and Sound, (2012-2018). Liaison with SEM, chair best student paper award committee.
- Associate Editor for ASME Journal of Vibration and Acoustics, (2015-2018).
- Guest Editor/Organized special issue for Mechanical Systems and Signal Processing.

CITIZENSHIP / SECURITY CLEARANCE

- Citizenship: United States Citizen (USA)
- Previously held Department of Energy (DOE) Q-clearance

BOOKS & BOOK CHAPTERS

- Engineering Dynamics 2nd Edition, Jerry H. Ginsberg, Matthew S. Allen & Philip Voglewede, Cambridge University Press, (in production as of Sept. 2025).
- Substructuring in Engineering Dynamics: Emerging Numerical and Experimental Techniques, Matthew S. Allen, Daniel Rixen, Maarten van der Seijs, Paolo Tiso, Thomas Abrahamsson and Randall L. Mayes, Springer, 2019, CISM International Centre for Mechanical Sciences, ISBN 978-3-030-25531-2 ISBN 978-3-030-25532-9 (eBook), https://doi.org/10.1007/978-3-030-25532-9
- The Mechanics of Jointed Structures, Editor: Matthew R. W. Brake, 2018.

- The Ampair 600 Wind Turbine: An In-Context Benchmark System, Daniel R. Roettgen & Matthew S. Allen
- Modal Iwan Models for Structures with Bolted Joints, Matthew S. Allen, Brandon J. Deaner & Daniel J. Segalman.
- Paolo Chiariotti, Christian Rembe, Paolo Castellini, and Matt Allen, "Laser Doppler Vibrometry Measurements in Structural Dynamics," Springer, New York, NY, (The Society for Experimental Mechanics), 2020, https://doi.org/10.1007/978-1-4939-6503-8

PATENTS

- "Apparatus For Dynamic Stress Measurement," Thelen, Martin, Allen, Segalman & Slane, US Patent # 10631775, Issued 4/28/2020.

PUBLICATIONS: HTTPS://BYUSDRG.COM

Refereed Journal Papers (BYU Students in Blue)

88.) Drithi Shetty, Matthew S. Allen & Emmon Das, "A Non-Parametric Iwan Model for Structures with Friction Nonlinearity," Nonlinear Dynamics, (Submitted Jan 2026).

87.) **Suzanna Gilbert** and Matthew S. Allen, "Modeling Bolted Joints in the S4 Beam at Various Preloads with Discrete Iwan Elements," International Journal of Non-linear Mechanics, (Submitted Oct 2025, Revised Jan 2026).

86.) **Jonathan K. Black**, Matthew S. Allen, Nathan Crane, and Tracy Nelson, "Viscoelastic finite element model for additively manufactured trapped-powder dampers," AIAA Journal, (Submitted Oct 2025).

85.) **Bacon, Ian; Dobbs, Corey;** Allen, Matthew S.; Patchett, Brian, "Characterizing the vibroacoustic response of pickleball paddles through impact testing and laser Doppler vibrometry," Journal of Sports Engineering and Technology, 2025, https://doi.org/10.1177/17543371251393306 .

84.) Nathan B. Speirs, Jesse Belden, Aren Hellum, **Jefferson Santos de Silva**, **Bradley McLaughlin**, Zhao Pan, Matt Allen, **Marcus Behling**, Micah Shepherd, "Acceleration-induced cavitation in external flows," Journal of Fluid Mechanics, (Submitted Sept. 2025).

83.) **Joshua Blackham**, **Cameron Stoker**, Matthew S. Allen, Brandon Rapp, "Nonlinear Model Updating for Dynamics of Riveted Joints," Mechanical Systems and Signal Processing, Volume 237, 15 August 2025, 113100, https://doi.org/10.1016/j.ymssp.2025.113100 .

82.) **Jonathan K. Black**, **Brooklyn Andrus, Derek Koski**, Matthew S. Allen, Nathan Crane, and Tracy Nelson, "Nonlinear Behavior of Additively Manufactured Steel Beams with Trapped-Powder Dampers," Journal of Structural Dynamics, 3, pp. 156-187, 2025, http://dx.doi.org/10.25518/2684-6500.285 .

81.) **Marcus Behling**, Matthew S. Allen, Randall L. Mayes & Washington de Lima, "Review of and Frameworks for Dynamic Environment Testing," Experimental Techniques, October 2025, https://doi.org/10.1007/s40799-025-00839-9 .

80.) **Brennen Clark**, Matthew S. Allen & Benjamin Pacini, "Study of the effect of bolted-joint damping-stiffness nonlinearity on part failures in dynamic environment testing," Experimental Techniques, 2025, https://link.springer.com/article/10.1007/s40799-025-00827-z .

79.) **Nolan Howes**, Matthew S. Allen, Dario Farina & Steven K Charles, "A generalized coherence framework for quantifying input contributions in multi-input systems with correlated or uncorrelated inputs," Biomedical Signal Processing & Control, Volume 104, June 2025, 107522, https://doi.org/10.1016/j.bspc.2025.107522 .

78.) M. R. W. Brake, Matthew S. Allen, D. D. Quinn, D. Nowell, D. R. Roettgen, "Testing and Modeling of Friction and Slip in Mechanical Interfaces: State of the Art and Perspectives for the Next Decade," Journal of Structural Dynamics, Special issue on Tribomechadynamics, pp. 46-87, 2024, https://doi.org/10.25518/2684-6500.219 .

77.) **Brennen Clark**, Matthew S. Allen & Benjamin Pacini, "Nonlinear Normal Modes and Response to Random Inputs of Systems with Bilinear Stiffness," Journal of Sound and Vibration, Volume 595, 20 January 2025, 118767, https://doi.org/10.1016/j.jsv.2024.118767 .

76.) **Marcus Behling, Bradon Thomason**, Randall L. Mayes, Matthew S. Allen and Washington J. DeLima, "A Simplified Method for Predicting Shaker Voltage in IMMAT," Experimental Techniques 2024, https://doi.org/10.1007/s40799-024-00750-9 .

75.) Malte Krack, M. R. W. Brake et al., (32 authors incl. M. S. Allen & **Courtney A. Payne**) "The Tribomechadynamics Research Challenge: Confronting blind predictions for the linear and nonlinear dynamics of a novel jointed structure with measurement results," Mechanical Systems and Signal Processing, Volume 224, 1 January 2025, 112016, https://doi.org/10.1016/j.ymssp.2024.112016.

74.) Matthew J. Tuman, **Marcus Behling**, Matthew S. Allen, Washington J. DeLima, Jonathan Hower & Randall L. Mayes, "Balancing Impedance and Controllability in Response Reconstruction with TS-IMMAT," Experimental Techniques, 2023. https://doi.org/10.1007/s40799-023-00645-1

73.) Michael Kwarta & Matthew S. Allen, "NIXO-Based Identification of the Dominant Terms in a Nonlinear Equation of Motion of Structures with Geometric Nonlinearity," Journal of Sound and Vibration, vol. 568, 2024, p. 117900. https://doi.org/10.1016/j.jsv.2023.117900

72.) Drithi Shetty & Matthew S. Allen, "A Parametric Study of the Bouc-Wen Model for Bolted Joint Dynamics," ASME Journal of Vibration and Acoustics, Aug 2023, vol. 145 no 4, p. 041004. https://doi.org/10.1115/1.4062103

71.) Michael Kwarta & Matthew S. Allen, "Nonlinear Identification through eXtended Outputs with Numerical and Experimental Validation," Mechanical Systems and Signal Processing, Volume 200, 1 October 2023, p. 110542. https://doi.org/10.1016/j.ymssp.2023.110542

70.) Drithi Shetty, Matthew S. Allen & Kyusic Park, "A New Approach to Model a System with Both Friction and Geometric Nonlinearity," Journal of Sound and Vibration, vol. 552, 26 May 2023, p. 117631. https://doi.org/10.1016/j.jsv.2023.117631

69.) **Sydney Ward**, Dario Farina, Matthew S. Allen & Steven Charles, "System identification of tremor propagation models using muscle excitation and wrist joint

rotation: a proof-of-concept study," IEEE Transactions on Biomedical Engineering (TBME), (Revised Oct. 2025).

68.) Seyed Iman Zare Estakhraji, Mitchell Wall, **Jacob Capito** & Matthew S. Allen, "A Thorough Comparison Between Measurements and Predictions of the Amplitude Dependent Natural Frequencies and Damping of a Bolted Structure," Journal of Sound and Vibration, Vol. 544, 3 February 2023, 117397, https://doi.org/10.1016/j.jsv.2022.117397

67.) Kyusic Park & Matthew S. Allen, "A Gaussian Process Regression Reduced Order Model for Geometrically Nonlinear Structures," Mechanical Systems and Signal Processing, Vol. 184, 1 February 2023, 109720, https://doi.org/10.1016/j.ymssp.2022.109720

66.) Jonathon L. Blank, Darryl G. Thelen, Matthew S. Allen and Joshua D. Roth, "Sensitivity of the Shear Wave Speed-Stress Relationship to Soft Tissue Material Properties and Fiber Alignment," Journal of Mechanical Behavior of Biomaterials, Vol. 125, January 2022, 104964, https://doi.org/10.1016/j.jmbbm.2021.104964

65.) A. Singh, M. S. Allen, R. J. Kuether, "Spider Configurations for Models with Discrete Iwan Elements," Mechanical Systems and Signal Processing, (Under revision, 2025).

64.) Aabhas Singh, Matthew S. Allen & Robert J. Kuether, "Multi-mode Quasi-static Excitation for Systems with Nonlinear Joints," Mechanical Systems and Signal Processing, Vol. 185, 15 February 2023, 109601, https://doi.org/10.1016/j.ymssp.2022.109601

63.) Iman Zare & Matthew S. Allen, "Extension of the Harmonic Balance Method for Dynamic Systems with Iwan Joints," Mechanical Systems and Signal Processing, Volume 166, 1 March 2022, 108434, https://doi.org/10.1016/j.ymssp.2021.108434

62.) Mitchell Wall, Robert J. Kuether & Matthew S. Allen, "Observations of Modal Coupling due to Bolted Joints in an Experimental Benchmark Structure," Mechanical Systems and Signal Processing, vol. 162, 2022, 107968, https://doi.org/10.1016/j.ymssp.2021.107968

61.) Kwarta, Michal K. & Matthew S. Allen, "Nonlinear Normal Mode Backbone Estimation with Near-Resonant Steady State Inputs," Mechanical Systems and Signal Processing, Volume 162, 1 January 2022, 108046, https://doi.org/10.1016/j.ymssp.2021.108046

60.) Iman Zare & M.S. Allen, "Time-Domain Numerical Continuation of Periodic Orbits for Harmonically Forced Hysteretic Nonlinear Systems," Journal of Sound and Vibration, Vol. 511, 27 October 2021, 116342, https://doi.org/10.1016/j.jsv.2021.116342

59.) Schumann, Christopher A; Matthew S. Allen; Matthew Tuman, Washington J Delima & Eric Dodgen, "Transmission Simulator Based MIMO Response Reconstruction," Experimental Techniques, May 2021, http://dx.doi.org/10.1007/s40799-021-00454-4

58.) Aabhas Singh; Matthew S Allen; Melissa Schmidt-Landin; Washington J Delima, "Multi–Input Multi–Output Hybrid Active Vibration Control for High Frequency Random Vibration," Experimental Techniques, April 2021, https://doi.org/10.1007/s40799-021-00465-1

57.) Francesco Latini, Jacopo Brunetti, Walter D'Ambrogio, Matthew S. Allen, Annalisa Fregolent, "Nonlinear substructuring in the modal domain: numerical validation and experimental verification in presence of localized nonlinearities," Nonlinear

Dynamics, vol. 104, pp 1043–1067, 2021, https://doi.org/10.1007/s11071-021-06363-w

56.) Dario Di Maio; Paolo Castellini; Milena Martarelli; Steve J Rothberg; Matthew S Allen; Weidong D Zhu; David J Ewins, "Continuous Scanning Laser Vibrometry: A Raison d'être and Applications to Vibration Measurements," Mechanical Systems and Signal Processing, Volume 156, July 2021, 107573, https://doi.org/10.1016/j.ymssp.2020.107573

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Refereed Conference Papers (25 total)

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- C. I. VanDamme & M.S. Allen, "Using Nonlinear Normal Modes to Optimize the Design of Geometrically Nonlinear Structures," AIAA Sci-Tech: 60th AIAA Structures, Structural Dynamics and Materials Conference, Orlando, Florida, 2019.
- C. I. Van Damme, A. E. Madrid & M. S. Allen, "Using the Harmonic Balance Method to Directly Compute NNMs of Geometrically Nonlinear Finite Element Models," ISMA-USD Noise and Vibration Engineering Conference 2018, Leuven, Belgium, Sept. 17-19, 2019.
- I. Zare & M. S. Allen, "A Block-Gauss Seidel Algorithm with Static Reduction to Predict Damping in Bolted Joints," ISMA-USD Noise and Vibration Engineering Conference 2018, Leuven, Belgium, Sept. 17-19, 2019.
- C. I. VanDamme, M.S. Allen & J. J. Hollkamp, "Nonlinear Structural Model Updating Based Upon Nonlinear Normal Modes," AIAA Sci-Tech: 59th AIAA Structures, Structural Dynamics and Materials Conference, Orlando, Florida, 2018.
- J. Schoneman, C. Ostoich, L. Jarman, C. I. Van Damme and M. S. Allen "Linear and Nonlinear Reduced-Order Modeling for Hypersonic Panel Flutter," AIAA Sci-Tech: 59th AIAA Structures, Structural Dynamics and Materials Conference, Orlando, Florida, 2018.
- E. Jewell, M. S. Allen, and R. Lacayo, "Predicting damping of a cantilever beam with a bolted joint using quasi-static modal analysis," in Proceedings of the ASME 2017 International Design Engineering Technical Conference & 13th International

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- J. Franz, C. Francis, M. S. Allen, and D. G. Thelen, "Visuomotor entrainment and the control of balance in walking," in IEEE 2016 Biomechanics and Neural Control of Movement (BANCOM) Conference Sterling, OH 2016
- S. J. Kelly, M. S. Allen, and H. A. Ardeh, "Multi-Point Multi-Harmonic Collocation With Continuation To Compute Branches Of Nonlinear Modes Of Structural Systems," in ASME 2015 International Design Engineering Technical Conference Boston, MA, 2015
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- M. S. Allen and B. Weekes, "Nonlinear Model Updating of a Flat Plate and a Stiffened Skin Panel from a Lynx Helicopter," in Scitech 2015, 56th AIAA Structures, Structural Dynamics and Materials Conference Kissimmee, Florida, 2015.
- D. A. Ehrhardt, R. J. Kuether, and M. S. Allen, "Nonlinear Normal Modes in Finite Element Model Validation of Geometrically Nonlinear Flat and Curved Beams," in Scitech 2015, 56th AIAA Structures, Structural Dynamics and Materials Confernece Kissimmee, Florida, 2015.
- J. D. Schoneman, M. S. Allen, and R. J. Kuether, "Relationships between Nonlinear Normal Modes and Response to Random Inputs," presented at the 5th AIAA/ASME/ASCE/AHS/SC Structures, Structural Dynamics, and Materials Conference, National Harbor, Maryland, 2014.
- R. J. Kuether and M. S. Allen, "Substructuring with Nonlinear Reduced Order Models and Interface Reduction with Characteristic Constraint Modes," presented at the 55th AIAA/ASME/ASCE/AHS/SC Structures, Structural Dynamics, and Materials Conference, National Harbor, Maryland, 2014.
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- M. S. Allen, R. J. Kuether, B. Deaner & M. W. Sracic, "A Numerical Continuation Method to Compute Nonlinear Normal Modes Using Modal Reduction," 53rd AIAA Structures, Structural Dynamics, and Materials Conference, Honolulu, Hawaii, April 23-26, 2012.
- S. Yang & M. S. Allen, "A Lifting Algorithm for Output-only Continuous Scan Laser Doppler Vibrometry," 53rd AIAA Structures, Structural Dynamics, and Materials Conference, Honolulu, Hawaii, April 23-26, 2012.
- M. S. Allen & M. W. Sracic, "System Identification of Dynamic Systems with Cubic Nonlinearities Using Linear Time-Periodic Approximations," ASME 2009 International Design Engineering Technical Conference IDETC, San Diego, California, Aug. 30-Sept. 2, 2009.
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- M. S. Allen, J. E. Massad, and R. V. Field, Jr. "Modeling and input optimization under uncertainty for a collection of RF MEMS devices," presented at 2006 ASME Congress in Chicago, IL, November 2006.
- M. S. Allen and T. G. Carne, "Comparison of Inverse Structural Filter (ISF) and Sum of Weighted Accelerations (SWAT) Time Domain Force Identification Methods," presented at the 47th AIAA-ASME-ASCE-AHS-ASC Structures, Structural Dynamics, and Materials Conference, Newport, Rhode Island, May 2006.

Submitted Conference Papers (155)

- Marcus Behling, Matthew S. Allen, Randall Mayes, and Washington DeLima, "Correlating Damage in Vibration Environments Using Fixed-Base Modal Responses," 44th International Modal Analysis Conference (IMAC XLIV), Garden Grove, CA, January 19-23, 2026.
- Jacob Cox, McKaelin Edralin, Matthew S. Allen, Michael Denison, Troy J. Skousen and Washington DeLima, "Combined Electromagnetic and Piezoelectric Shaker System for High Frequency Environment Testing," 44th International Modal Analysis Conference (IMAC XLIV), Garden Grove, CA, January 19-23, 2026.
- Cody Greener and Matthew S. Allen, "Local Models to Identify the Nonlinear Behavior of a Bolted Joint," 44th International Modal Analysis Conference (IMAC XLIV), Garden Grove, CA, January 19-23, 2026.
- Jared Ashcraft, Matthew Ashcraft, Matthew S. Allen, and Brandon Rapp, "Reduced Order Modeling of Modal Coupling in Riveted Sandwich Beams," 44th International Modal Analysis Conference (IMAC XLIV), Garden Grove, CA, January 19-23, 2026.
- Harrison C. Denning, Matthew S. Allen, Jeffrey R. Hill, and Daniel R. Roettgen, "Component Mode Synthesis Substructuring in Shock Conditions," 44th International Modal Analysis Conference (IMAC XLIV), Garden Grove, CA, January 19-23, 2026.
- Sean Magoffin, Eli Smith, Matthew S. Allen, "Design and Quasi-Static Modal Analysis to Predict Nonlinear Behavior of a Finger Seal," 44th International Modal Analysis Conference (IMAC XLIV), Garden Grove, CA, January 19-23, 2026.
- Eli Smith, Sean Magoffin, Cody Greener, and Matthew S. Allen, "Manufacturing and Testing a Finger Seal and Comparison with Reduced Order Models," 44th International Modal Analysis Conference (IMAC XLIV), Garden Grove, CA, January 19-23, 2026.

- Maura C. Hart, Jackson A. Jones, Kyle Crapo, Madyson G. Hodson, Connor Crandall, Mason Rollans, Matthew S. Allen, Michael Denison, "Vibration Measurement and Mitigation Development for Multi-Shaker Test Stand," 44th International Modal Analysis Conference (IMAC XLIV), Garden Grove, CA, January 19-23, 2026.
- R. Thayne Wagner, Mason Rollans, Matthew S. Allen, Jeffrey R. Hill, "Shock Response of LPBF Beams with Pockets of Trapped Powder," 44th International Modal Analysis Conference (IMAC XLIV), Garden Grove, CA, January 19-23, 2026.
- Jonathan K. Black, Jacob Cox, Derek Koski, Carlos Inca Roca, Brooklyn Andrus, and Matthew S. Allen, "Applying a Viscoleastic Model to Multiple Unique Additively-Manufactured Trapped-Powder Dampers," presented at the 44th International Modal Analysis Conference (IMAC XLIV), Garden Grove, CA, USA, Jan. 2026.
- Rice, Aidan, Taylor, Joshua, Clark, Brennen, Breunung, Thomas, Allen, Matthew S., and Joshua, Raymond, "Comparison of Nonlinear System Identification and Modal Methods for Steady-State Measurements from the S4 Beam," presented at the 43rd International Modal Analysis Conference (IMAC XLIII), Orlando, FL, Feb. 2025.
- Brennen Bahr, Benjamin J. Crapo, Matthew S. Allen and Raymond Joshua, "Comparing Multi-Point Constraints in Nonlinear Modeling of a Two-Dimensional Beam," presented at the 43rd International Modal Analysis Conference (IMAC XLIII), Orlando, FL, Feb. 2025.
- Jonathan K. Black, Brooklyn Andrus, Derek Koski, Nathan Crane, Tracy Nelson, and Matthew S. Allen, "Nonlinear Behavior of Additively Manufactured Steel Beams with Trapped Powder Dampers," presented at the 43rd International Modal Analysis Conference (IMAC XLIII), Orlando, FL, Feb. 2025.
- Josh Blackham, Cameron Stoker, Matthew S. Allen, and Brandon Rapp, "Nonlinear Model Updating for Riveted Joints," presented at the 43rd International Modal Analysis Conference (IMAC XLIII), Orlando, FL, Feb. 2025.
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- Harrison C. Denning, Scott Tuley, Matthew S. Allen, Jeffrey R. Hill, Daniel R. Roettgen, "Finite Element Modeling and Substructuring to Simulate Shock Plate Testing," presented at the 43rd International Modal Analysis Conference (IMAC XLIII), Orlando, FL, Feb. 2025.
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- Nolan H Howes, Matthew S Allen, Dario Farina and Steven K Charles, "A Generalized Coherence Framework for Quantifying Input Contributions in Multi-Input Systems with Correlated or Uncorrelated Inputs," presented at the 43rd International Modal Analysis Conference (IMAC XLIII), Orlando, FL, Feb. 2025.
- Sean Magoffin, Brooklyn Andrus, Matthew S. Allen and Raymond Joshua, "Linear and Nonlinear Response of a Continuous-Interface BARC: FEA Prediction and Test," presented at the 43rd International Modal Analysis Conference (IMAC XLIII), Orlando, FL, Feb. 2025.

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- M. S. Allen & S. A. Miller, "Effect of Model Order Ambiguity in Experimental Modal Analysis on Substructuring Predictions," in 27th International Modal Analysis Conference (IMAC XXVII), Orlando, Florida, Feb. 2009.
- M. S. Allen and M. W. Sracic, "Mass Normalized Mode Shapes Using Impact Excitation and Continuous-Scan Laser Doppler Vibrometry," in 8th International Conference on Vibration Measurements by Laser Techniques, Ancona, Italy, 2008, pp. 7098-3.
- M. S. Allen & M. W. Sracic, "A Method for Generating Pseudo Single-Point FRFs from Continuous Scan Laser Vibrometer Measurements," 26th International Modal Analysis Conference (IMAC XXVI), Orlando, Florida, Feb. 2008.
- E. J. Bergman, M. S. Allen, D. C. Kammer & R. L. Mayes, "Probabilistic Investigation of Sensitivities of Advanced Test-Analysis Model Correlation Methods," 26th International Modal Analysis Conference (IMAC XXVI), Orlando, Florida, Feb. 2008.
- M. S. Allen, H. Sumali & E. B. Locke, "Experimental/Analytical Evaluation of the Effect of Tip Mass on Atomic Force Microscope Calibration," 26th International Modal Analysis Conference (IMAC XXVI), Orlando, Florida, Feb. 2008.
- R. L. Mayes, P. S. Hunter, T. W. Simmermacher & M. S. Allen, "Combining Experimental and Analytical Substructures with Multiple Connections," 26th International Modal Analysis Conference (IMAC XXVI), Orlando, Florida, Feb. 2008.
- M. S. Allen & R. L. Mayes, "Comparison of FRF and Modal Methods for Combining Experimental and Analytical Substructures," 25th International Modal Analysis Conference (IMAC XXV), Orlando, Florida, Feb. 2007.
- M. S. Allen and J. H. Ginsberg, "Floquet Modal Analysis to Detect Cracks in a Rotating Shaft on Anisotropic Supports," 24th International Modal Analysis Conference (IMAC XXIV), St. Louis Missouri, Feb. 2006.
- M. S. Allen and J. H. Ginsberg, "Global, Hybrid, MIMO Implementation of the Algorithm of Mode Isolation," 23rd International Modal Analysis Conference (IMAC XXIII), Orlando, Florida, 2005.

- M. S. Allen, J. H. Ginsberg, and A. Ferri, "Modal Identification of the Z24 Bridge Using MIMO-AMI," 23rd International Modal Analysis Conference (IMAC XXIII), Orlando, Florida, 2005.
- M. S. Allen and J. H. Ginsberg, "SIMO Extension of the Algorithm of Mode Isolation," presented at the 22nd International Modal Analysis Conference (IMAC XXII), Dearborn, Michigan, 2004.
- J. H. Ginsberg and M. S. Allen, "Recent Improvements of the Algorithm of Mode Isolation," presented at Proceedings of IMECE'03, ASME International Mechanical Engineering Congress and Exposition, NCA, Washington, DC, 2003.
- M. S. Allen, C. Moloney, J. H. Ginsberg, and A. Ferri, "Comparison of a Linear Least Squares Algorithm and STAR Modal for a Square Elastic Plate," presented at the 21st International Modal Analysis Conference (IMAC XXI), Orlando, Florida, 2003.
- J. H. Ginsberg, M. S. Allen, A. Ferri, and C. Moloney, "A General Linear Least Squares SDOF Algorithm for Identifying Eigenvalues and Residues," presented at the 21st International Modal Analysis Conference (IMAC XXI), Orlando, Florida, 2003.
- W. F. Pratt, S. Sommerfeldt and M. Allen, "Testing Wavy Composites," Science of Advanced Materials and Process Engineering Series, 45, Book 1, 216-228, 2001.
- W. F. Pratt, M. Allen and C. G. Jensen, "Designing with Wavy Composites," Science of Advanced Materials and Process Engineering Series, 45, Book 1, 203-215, 2001.
- W. F. Pratt and M. S. Allen, "Characterization and Finite Element Model Correlation of Wavy Composites," 33rd International SAMPE Technical Conference, Seattle, WA, 2001.
- W. F. Pratt and M. S. Allen, "Testing and Characterization of Highly Damped Structural Materials," 33rd International SAMPE Technical Conference, Seattle, WA, (2001).

AFRL Final Reports

- M.S. Allen, C. I. Van Damme, M. Kwarta, "Testing and Model Updating for Geometrically Nonlinear Hypersonic Vehicle Assemblies using Nonlinear Normal Modes," Contract # FA9550-17-1-0009, Air Force Office of Scientific Research, 2020.
- M.S. Allen, R. J. Kuether & J.D. Schoneman, "(YIP11) Substructuring with Nonlinear Subcomponent Models Based on Nonlinear Normal Modes with Application to Hypersonic Vehicle Design," Contract # FA9550-11-1-0035, Air Force Office of Scientific Research, 2014.
- W. F. Pratt, M. S. Allen and T. J. Skousen, "Highly Damped Lightweight Wavy Composites," AFRL-VS-TR-2001, Phillips Air Force Research Laboratory, Kirkland AFB, NM, 2001.

Invited Presentations

- "Advances in Testing, Modeling and Predicting the Response of Bolted Structures," Online Seminar to the ASME Technical Committee on Vibration and Sound, 2 May 2024.
- "Modern Challenges in Structural Dynamics and Recent Advances for Nonlinear Systems," Seminar at National Tsing Hua University, Hsinchu, Taiwan, 1 June 2023.
- "Overview of Modeling and Test Methods for Nonlinearity due to Friction at Interfaces," National Chung Hsing University, Taichung, Taiwan, 31 May 2023.
- "Data-Driven Reduced Order Modeling and Model Updating of Geometrically Nonlinear Structures," Presentation to Structural Sciences Center at Air Force Research Laboratory, Dayton, OH, May 2023.

- "Modeling Friction and Contact at Interfaces in Structural Dynamics," Presentation to Structural Sciences Center at Air Force Research Laboratory, Dayton, OH, May 2023.
- "An Introduction to Structural Dynamics, Experimental Modal Analysis and Substructuring," Acoustics Research Group Seminar, Brigham Young University, Nov. 11, 2021.
- "What is it really like to do research? Reflections on 20 Years of Research in Structural Dynamics," Mechanical Engineering Department, Brigham Young University, September 2021.
- "An Introduction to Structural Dynamics, Experimental Modal Analysis and Substructuring," Tribo-Mecha-Dynamics Virtual Seminar Series, May 11, 2021.
- "System Identification and Quasi-static Modeling for Structures with Bolted Joints: Current Status and Future Directions," 8th International Conference On Nonlinear Vibrations, Localization and Energy Transfer, Ascona, Switzerland, July 6-9, 2021.
- "Analysis, Design and Model Updating of Geometrically Nonlinear Finite Element Models using Nonlinear Normal Modes," Mechanical Engineering Department, Brigham Young University, Jan 15, 2020.
- "Interfacing Measurements and Modeling for Nonlinear Systems: Current Challenges and Opportunities," Seminar at Imperial College, London, UK, Jan. 13, 2020.
- "Interfacing Measurements and Modeling for Nonlinear Systems: Current Challenges and Opportunities," DigiTwin Quarterly Meeting, Brisol, UK, Jan. 8, 2020.
- "Modern Challenges in Structural Dynamics and Recent Advances," Seminar at Brigham Young University, Nov. 19, 2018.
- "Structural Dynamics Challenges in Launch: How can we get things to space without shaking them apart?" Invited Seminar at the UW-Madison Space Place, Dec. 12, 2017. (Recorded for rebroadcast on Wisconsin Public Television).
- "Challenges in Modeling Friction and Contact at Interfaces in Structural Dynamics," Mechanics Seminar Series, UW-Madison, Oct. 27, 2017
- "Overview of Modeling and Test Methods for Nonlinearity due to Friction at Interfaces," Invited Seminar at Penn State University, Oct. 13, 2017.
- "Challenges in Modeling Friction and Contact at Interfaces in Structural Dynamics," Engineering Mechanics Seminar, Oct. 2017.
- "Nonlinear Normal Modes: A Unifying Concept to Understand and Design Nonlinear Dynamic Systems," Invited seminar, Chaos Seminar Series, UW-Madison, Sept. 19, 2017.
- "Nonlinear Normal Modes: A Unifying Concept to Understand and Design Nonlinear Dynamic Systems," Invited Tutorial Lecture Air Force Research Laboratory, Dayton, OH, Aug. 10, 2017.
- "An Introduction to Interface Modeling and Reduction in Structural Dynamics," Sandia National Laboratories, NOMAD Institute, June 2017
- "Nonlinear Normal Modes: A Unifying Concept to Understand and Design Nonlinear Dynamic Systems," Invited Tutorial Lecture for NASA Engineering & Safety Center, Loads and Dynamics Technical Discipline Team, April 10, 2017.

- "Analysis, Design and Model Updating of Geometrically Nonlinear Finite Element Models using Nonlinear Normal Modes," Aerospace Engineering Department, University of Michigan, Sept. 15, 2016.
- "How are Nonlinear Normal Modes Useful for Structural Dynamic Design/Analysis?," Invited Tutorial Lecture at the 6th International Conference on Nonlinear Vibrations, Localization and Energy Transfer, Liege, Belgium, July 5, 2016
- "Advances in Experimental-Analytical Substructuring and Extensions for Nonlinear Systems," Invited Seminar at ATA Engineering, San Diego, CA, June 10, 2016.
- "Numerical Computation of Nonlinear Normal Modes for Geometrically Nonlinear Finite Element Models with Application to Substructuring and Model Validation," Ohio State University, Oct. 3, 2014.
- "Modeling the Nonlinear Damping of Jointed Structures using Iwan Models: Discrete & Modal ," Sandia National Laboratories, Joints Institute, July 2014.
- "Numerical Computation of Nonlinear Normal Modes for Geometrically Nonlinear Finite Element Models with Application to Substructuring and Model Validation," Imperial College, London, May 28, 2014.
- "Numerical Computation of Nonlinear Normal Modes for Geometrically Nonlinear Finite Element Models with Application to Substructuring and Model Validation," University of Sheffield, May 21, 2014.
- "Numerical Computation of Nonlinear Normal Modes for Geometrically Nonlinear Finite Element Models with Application to Substructuring and Model Validation," University of Bristol, May 14, 2014.
- "An Overview of Substructuring Research at the University of Wisconsin," Lindberg Lecture Series, Mechanical Engineering Department, University of Wisconsin-Madison, March, 2013.
- "Response Prediction for Structural Dynamic Systems with Experimental-Analytical Substructuring," Engineering Physics Department Colloquium, University of Wisconsin-Madison, February, 2013.
- "System Identification for Linear Time Varying Systems with Application to Rotating Turbines and Continuous Scan Laser Vibrometry," Wind Turbine Blade Workshop, Albuquerque, NM, June 1, 2012.
- "Frequency-Domain System Identification for Linear Time-Periodic Systems with Application to Wind Turbine Dynamics and CSLDV," Brüel & Kjær Sound & Vibration Measurement, Copenhagen, Denmark, May 30, 2012.
- "Nonlinear Normal Modes for Geometrically Nonlinear Structures: Computation Methods and Implications for Substructuring," Department of Mechanical and Aerospace Engineering, University of Liege, Liege, Belgium, May 29, 2012.
- "Frequency-Domain System Identification for Linear Time-Periodic Systems with Application to Wind Turbine Dynamics and CSLDV," Department of Mechanical Engineering, Chalmers University, Gothenburg, Sweden, May 24, 2012.
- "Overview of Substructuring, the Transmission Simulator Method and Dynamics Research at UW-Madison," Presentation delivered via teleconference to General Motors, Milford Proving Ground, Milford, MI, March 3, 2012.

- "Geometric Nonlinearity and Nonlinear Modes: Potential Applications to Exhaust Components," Presentation delivered via teleconference to Cummins Emissions Solutions, Stoughton, WI, Feb. 20, 2012.
- "From Lasers to Wind Turbines: Frequency-Domain System Identification for Linear Time-Periodic Systems," University of Maryland, Baltimore County, Department of Mechanical Engineering, December, 2011.
- "Experimental Modal Substructuring to Estimate Fixed-Base Modes from Tests on a Flexible Fixture," Trane / Ingersol Rand Inc., Lacrosse, WI, March, 2011.
- "From Lasers to Wind Turbines: Frequency-Domain System Identification for Linear Time-Periodic Systems," Washington University at Saint Louis, October, 2010.
- "From Lasers to Wind Turbines: Frequency-Domain System Identification for Linear Time-Periodic Systems," Rheology Research Center, University of Wisconsin-Madison, February, 2010.
- "Accelerated Vibration Testing using Continuous-Scan Laser Doppler Vibrometry (CSLDV)," WARF First Look Forum, April, 2009.
- "System Identification and Uncertainty in Dynamic Systems", Invited presentation to College of Engineering, Marquette University, Milwaukee, WI, September 2008
- "Comparison of Uncertainty Propagation / Response Surface Techniques for Two Aeroelastic Systems," Air Force Research Laboratory, Dayton, OH, August, 2008.
- "Overview of Research in System Identification and Continuous-Scan Laser Doppoler Vibrometry," ATA Engineering, Madison, WI, March 2008.
- "Mechanics Research in the Dept. of Engineering Physics," Exelon Nuclear, Chicago, IL, October 2007.
- "Effect of Uncertainty on Test-Analysis Model Correlation," Air Force Research Laboratory, Kirtland AFB, Albuquerque, NM, 2007.
- "Overview of Research in M.S. Allen Group: System Identification and Uncertainty in Dynamic Systems," Trane / Ingersol Rand Inc., Lacrosse, WI, April 2007.
- "A Multi-Input-Multi-Output (MIMO) Version of the Algorithm of Mode Isolation (AMI)," presented at the 150th Meeting of the Acoustical Society of America, Minneapolis, Minnesota, October 2005.

Other Presentations

- McLaughlin, B.**, Belden, J., Hellum, H., Santos da Silva, J.*, Pan, Z., Allen, M., Behling, M.**, Shepherd, M. & Speirs, N., "Ripping apart liquids with acceleration," 77th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Salt Lake City, UT. November 24-26, 2024.
- David Phair, Jackson Wilcox, Mitchell Zoolakis, Matt Allen, Christopher Dillon, "Tendon Shear Wave Tensiometry: Application to Flexor Pollicis Longis," ASME IDETC Conference, August 2023, Boston, MA.
- I. Zare, M. S. Allen, "Computing Nonlinear Frequency Response Functions (FRFs) for Systems with Iwan Joints," 38th International Modal Analysis Conference (IMAC XXXVIII), Houston, Texas, February 10-13, 2020.
- C. A. Schumann, M. S. Allen, W. J. DeLima, E. Dodgen, "Transmission Simulator Based MIMO Response Reconstruction for Vehicle Subcomponents," 38th International Modal Analysis Conference (IMAC XXXVIII), Houston, Texas, February 10-13, 2020.

- Zare, Iman, Jewell, Emily and Allen, Matthew S., "An Enhanced Static Reduction Algorithm for Predictive Modeling of Bolted Joints," in Proceedings of the 36th International Modal Analysis Conference (IMAC XXXVI), Orlando, Florida, USA, 2018.
- M. S. Allen, D. M. Aguilar, M. W. Sracic & S. Yang, "2D Continuous-Scan Laser Doppler Vibrometry Applied to Condenser Fan," 158th Meeting of the Acoustical Society of America, San Antonio, Texas, Oct. 2009.
- M. S. Allen and J. H. Ginsberg, "On the Accuracy of Modal Parameters Identified from Exponentially Windowed, Noise Contaminated Impulse Responses for a System with a Large Range of Decay Constants." 148th Meeting of the Acoustical Society of America, San Diego, California, Nov. 2004. Received the "Best Student Paper Award."

.EXTRACURRICULAR / SERVICE ACTIVITIES

- Fluent in Spanish, beginning French.
- Served a two-year, full-time mission in Guatemala, Central America. Taught religious and life principles and developed a strong appreciation for Latin American culture.
- Enthusiastic skier, hiker and photographer. Also enjoy editing home videos and playing the piano.