

Lori Graham-Brady

Professor and Chair, Department of Civil & Systems Engineering
Secondary appointment, Mechanical Engineering
Secondary appointment, Materials Science & Engineering
Associate Director, Hopkins Extreme Materials Institute

Johns Hopkins University
Baltimore, MD 21218
1-410-516-8167
Email: lori@jhu.edu
www.ce.jhu.edu/lori

Education

- 1996 Ph.D., Civil Engineering & Operations Research, Princeton University
Variability Response Functions and the Weighted Integral Method in Stochastic Finite Element Analysis
Thesis Adviser: G. Deodatis
- 1994 M.A., Civil Engineering, Princeton University
- 1990 B.E./A.B., Engineering Sciences, Dartmouth College

Professional experience

- 2000- *Johns Hopkins University*
Professor, Civil & Systems Engineering (since 2011)
Chair, Civil & Systems Engineering (since July 2015)
Secondary Appointment, Mechanical Engineering
Secondary Appointment, Materials Science and Engineering
- 1996-2000 *University of Virginia*
Assistant Professor, Civil Engineering
- 1990-1992 *ABB Combustion Engineering*
Project Manager, Nuclear Engineering

Honors and awards

- 2019 Fellow, US Association for Computational Mechanics
- 2013 Fellow, ASCE Engineering Mechanics Institute
- 2009 ASCE Walter L. Huber Civil Engineering Research Prize
- 2008 William H. Huggins Excellence in Teaching Award
- 2005 IASSAR Junior Research Prize: Stochastic Fatigue, Fracture & Damage
- 2000 Presidential Early Career Award for Scientists & Engineers (PECASE)
- 2002 ASCE Faculty Advisor Reward
- 2002 JHU Alumni Relations Excellence in Teaching Award
- 2002 ASCE Maryland Section Young Civil Engineer of the Year
- 1999 National Science Foundation CAREER Grant
- 1999 NAE Frontiers of Engineering invited participant
- 1999 Civil Engineering Research Foundation (CERF) Career Development Award
- 1999 ASEE Southeastern Section Outstanding New Teacher Award
- 1999 UVA Civil Engineering Teaching Award
- 1997 ASEE Summer Faculty Fellow, Naval Surface Warfare Center

Research interests

Multi-Scale Modeling of Materials with Random Microstructure; Dynamic Failure of Brittle Materials; Stochastic Finite Elements; Probabilistic Mechanics; Stochastic Simulation of Material Properties; Micromechanics; Random Heterogeneous Materials; Structural Stability; Composite Mechanics; Computational Stochastic Mechanics

Research projects

- 2012-2022 *A Collaborative Program for the Multiscale Modeling and Design of Materials for Extreme Dynamic Environments (CMEDE)*, Army Research Labs (Associate Director/co-PI 2012-20; Director/PI 2021-22).
- 2017-2018 *Correlation-based Simulation of Complex Material Microstructures*, Corning Incorporated (PI)
- 2012-2018 *Center of Excellence on Integrated Materials Modeling (CEIMM)*, Air Force Research Labs (co-PI).
- 2013-2016 *Debris Modeling for Nuclear Weapon Effects on Building Facades*, Defense Threat Reduction Agency through a subcontract with Protection Engineering Consultants (co-PI).
- 2008-2015 *IGERT: Modeling Complex Systems - The Scientific Basis of Coupling Multi-Physics Models at Different Scales*, National Science Foundation (Director/PI).
- 2010-2014 *Strain-rate dependent properties of cement-based materials: a multi-scale experimental and modeling effort*, National Science Foundation (PI).
- 2011-2013 *Surviving Contact: A Revolutionary Approach to Controlling the Energy Pathways in Armor Ceramics*, DARPA (co-PI).
- 2009-2013 *MRI: Acquisition of 100TF Graphics Processor Laboratory for Multiscale/Multiphysics Modeling*, National Science Foundation (co-PI).
- 2006-2011 *Dynamic behavior of non-crystalline and nanocrystalline metallic systems*, Army Research Labs (co-PI).
- 2005-2009 *Stochastic Structural Stability*, National Science Foundation (co-PI).
- 2003-2006 *Theoretical, Experimental, and Stochastic Multi-Scale Analysis of Concrete*, National Science Foundation (PI).
- 2000-2006 *Presidential Early Career Award for Scientists & Engineers*, National Science Foundation (PI).
- 1999-2006 *CAREER: Micro-scale Based Reliability Analysis of Mechanical and Flow-Related Behavior of Heterogeneous Materials for Macro-scale Infrastructure and Geotechnical Applications*, National Science Foundation (PI).
- 2003-2005 *Probability and Materials: from Nano- to Macro-scale*, National Science Foundation (PI).
- 2000-2003 *Analysis and design of material microstructure using stochastic simulation techniques*, National Science Foundation (PI).

1998-2001 *Influence of Random Microstructure on Stress Concentrations in Functionally Graded Composites*, National Science Foundation (PI).

Administrative experience

2015- *Chair, Civil and Systems Engineering*

The Chair of Civil and Systems Engineering oversees this department of about 12 JHU faculty, 70 graduate students and postdoctoral scholars, and 50 undergraduates. The Department budget is approximately \$5.5 million per year, and the Chair manages a team of 6 staff members that support the financial wellbeing of the Department, grants preparation and administration, coordination of academic programs, external communications, and activities that foster a positive Civil Engineering student experience. An external advisory board consisting of members from both industry and academia assists the Chair in identifying possible future directions and supporting initiatives that help the Department in its educational mission. The Chair also coordinates with the Dean's Office to ensure that all departmental operations are consistent with Whiting School of Engineering operating procedures, and that the Department's vision aligns with the School's strategic plan.

2012- *Associate Director, Hopkins Extreme Materials Institute*

The Associate Director works with the Director and Executive Program Director to help oversee this Institute with 21 JHU faculty, about 50 JHU graduate students and postdoctoral scholars, and partnerships with faculty and scientists at over 20 universities and organizations all over the world. The Institute budget is in excess of \$7.5 million per year, requiring significant coordination with JHU administration, partner organizations and relevant external funding agencies. The Associate Director helps to oversee 8 staff that work in HEMI and leads many of the HEMI community-building activities, including initiating and serving as Chair for a conference series initiated in and held annually since 2013, the Mach Conference, which attracts over 200 participants each year.

2008-2016 *Director, JHU Modeling Complex Systems IGERT*

This IGERT program provided partial funding for 25 Ph.D. students at Johns Hopkins University from 6 different departments, almost half of which were women or members of STEM underrepresented minority groups. The Director managed the entire program, with support from the IGERT Project Coordinator Latanya Waith. The program initiated new courses in professional development (professional communications and outreach) and a generalized technical course related to modeling complex systems (Advanced Parameterization in Science and Engineering). A novel student-run colloquium series served as the focal point for trainee interactions.

Ph.D. student supervision

- In progress Amartya Bhattacharjee (5th year)
Noah Wade (5th year)
Ashwini Gupta (2nd year)
- 2019 Anindya Bhaduri (Civil Engineering – *now a postdoctoral scholar at JHU*)
2017 Farah Huq (Civil Engineering – *now at Intel*)
2015 Junwei Liu (Civil Engineering – *now at Medtronic*)
2013 Cynthia Zingale Katcoff (Civil Engineering – *now at Whitman Requardt*)
2009 Katherine Acton (Civil Engineering – *now at University of St. Thomas*)
2008 Mazdak Tootkaboni (Civil Engineering – *now at Univ. of Massachusetts Dartmouth*)
2005 Xi Frank Xu (Civil Engineering – *now at Beijing Jiaotong University*)
2005 Fernando Ferrante (Civil Engineering – *now at Electric Power Research Institute*)
2003 Jennifer Hooper (Materials Sci. & Engg., secondary advisor with Prof. T. Weihs as primary advisor)
2002 Eman F. Siragy (UVA Civil Engineering)

Post-doctoral research supervision

- 2019- Anindya Bhaduri
2018-2020 Audrey Olivier (*Assistant Professor, University of Southern California*)
2017-2019 Mehmet Cil (*Engineer, Bechtel Corporation*)
2015-2017 David Cereceda Senas (*Asst. Prof., Villanova University*)
2015-2016 Bahar Ayhan (*Research Asst., Istanbul Technical University*)
2013-2015 Kirubel Teferra (*Mechanical Engineer, US Naval Research Laboratory*)
2014 Tuan Hoang (co-advised by N. Daphalapurkar)
2010 Mazdak Tootkaboni (co-advised by J. Guest, *Asst. Prof., UMass Dartmouth*)
2009-2010 Hyoungseock Seo (co-advised by T. Hufnagel, *Samsung*)
2009 Katherine Acton (*Asst. Prof., University of St. Thomas*)
2001-2004 David Corr (*Clinical Assoc. Prof., Northwestern University*)

Research M.S. student supervision

- 2020 Jamey Hogarth
2000 Erik A. Phillips (UVA)
2000 Fernando J. Ferrante (UVA)
2000 Aimee M. LeBlanc (UVA)
1999 Gregory C. Alber (UVA)

Visiting graduate student supervision

- 2019 Sebastian Geyer (Technical University of Munich, Germany)
2016 Hongjie Wang (Tsinghua University, China)
2014 Xia Yu (Guangxi University of Science and Technology, China)
2012 Mahdi Roozbahani (University Putra Malaysia, Malaysia)
2007 Sarah Levy (ENS Cachan, France)
1999 Vincent Riboulet (ENS Cachan, France)
2004 Doo Bo Chung (Delft University of Technology, Netherlands)

Undergraduate research supervision

2018	Natasha Dada (Columbia University)
2017	Moses Kayondo (Morgan State University)
2016	David Weiner Light
2014	Matan Grossman
2010	Seth Tibbitts
2009	Michael Schector, James Zhou
2001	Jason Hughes, Maryam Khan, Erin Sadownik, Josh Hollman
1999	Jacob Agran (UVA), Kevin Smith (UVA)
1998	Julie Kemerer (UVA)
1997	Jennifer Marr (UVA)

High school student research supervision

2019	Shreya Gandhi (Bryn Mawr Girls School)
2019	Curtis Cooper (Mt. St. Joseph's High School)
2018,2019	Michelle Feng (Bryn Mawr Girls School)
2018	Chimmy Iheanye-Igwe (Howard High School)
2017	Sophia DeVito (Bryn Mawr Girls School)
2016,2017	Natasha Dada (Bryn Mawr Girls School)
2016	Samuel Robertson (Mt. St. Joseph's High School)
2016	Fatima Ceesay (Chesapeake Math and IT Academy)
2015	Christine Blackshaw (Bryn Mawr Girls School)
2014	Anna Delwyche (Bryn Mawr Girls School)

Teaching experience

560.201	Statics & Strength of Materials 7 semesters (63-125 students/semester)
560.202	Dynamics 5 semesters (5-49 students/semester)
560.206	Solid Mechanics & Theory of Structures 3 semesters (10-19 students/semester)
560.240	Uncertainty, Reliability and Decision Making 1 semester (3 students)
560.301	Theory of Structures 4 semesters (8-18 students)
560.348	Probability & Statistics in Civil Engineering 3 semesters (50-75 students/semester)
560.604	Solid Mechanics for Structures 1 semester (18 students)
560.700	Applications of Science-Based Coupling of Models 1 semester (15 students)
560.702	Modeling Complex Systems Colloquium 6 semesters (7-12 students/semester)
560.728	Stochastic Micromechanics 1 semester (6 students)

560.729	Structural Mechanics 6 semesters (9-28 students/semester, once co-taught with J. Guest)
560.730	Finite Element Methods 4 semesters (12-16 students/semester)
560.733	Computational Plasticity 2 semesters (4-8 students/semester)
560.757	Random Fields 1 semester (15 students)
560.768	Structural Reliability 1 semester (17 students, co-taught with B. Schafer)
ENGR 205	Solid Mechanics I - Statics (University of Virginia) 3 semesters (17-53 students/semester)
CE 206	Solid Mechanics – Statics and Strength of Materials (University of Virginia) 1 semester (51 students)
CE 452	Introduction to Seismic Design (team-taught, University of Virginia) 1 semester (18 students)
CE 470	Civil Engineering Design Project (University of Virginia) 8 semesters (1-3 students/semester)
CE 471	Introduction to Finite Element Methods (University of Virginia) 3 semesters (8-16 students/semester)
CE 691	Reliability Methods in Civil Engineering (University of Virginia) 1 semester (25 students – distance learning course)

Academic advising

2016-2020	Four year adviser for Civil Engineering Class of 2020 – 6 students
2017	BS/MSE student advisor (4 students)
2015	Ashley Feldman (MSEM), Matthew Mercede (MSEM)
2014	Alexander Horn (MSE), Michael Lijoi (MSE), Taylor Woodrum (MSE), Lindsay Adam (MSEM)
2013	Brian Roye (MSE), Brian Lindberg (MSE)
2012	Josh Kahan (MSE), Samantha Combs (MSE), Nerisa Holder (MSE), Cyril Thomas (MSE), Xi Zhao (MSE), Qingyuan Li, (MSE) Brandon Simms (MSEM)
2011	Seth Tibbitts (MSE), Chenqi Zhou (MSE), Christophe Locussol (MSE)
2010	Mingming McRobie (MSE)
2010-2011	Advisor for 5 members of the Civil Engineering Class of 2011
2006-2010	Four year adviser for Civil Engineering Class of 2010 – 10 students
2006	Ameenah Saleem (MSE)
2004-2005	Senior year adviser for Civil Engineering Class of 2005 – 7 students.
2000-2003	Four year adviser for Civil Engineering Class of 2003 – 12 students
2000	Bligh Wollner (MS, UVA)

Graduate committee membership

2000-2020	64 Graduate Board Oral examination committees
2000-2020	7 Ph.D. proposal committees
2000-2020	45 Departmental Qualifying Exam committees
1996-2020	45 Ph.D. defense committees

Mentoring

- 2014- Mentor for 3 JHU Assistant Professors outside Civil & Systems Engineering
- 2009-2015 Advisor, JHU Chapter of the Society for Women Engineers
- 2000-2002 Advisor, JHU American Society of Civil Engineers student chapter
- 1997-2000 Mentor through the UVA Office of African American Affairs
Nominated for Mentor of the Year in 1999

SERVICE

Service to profession – *editorial activities*

- 2014- Associate Editor, *ASCE Journal of Engineering Mechanics*
- 2019- Editorial Board of *Jnl. of Theoretical, Computational & Applied Mechanics*
- 2017- Editorial Board of *Structural Safety*
- 2007- Editorial Board of *Probabilistic Engineering Mechanics*
- 1998- Editorial Board of *Computer Modeling in Engineering & Sciences*
- 2003- Technical Committee, *Intl. Journal of Materials & Structural Reliability*
- 2005 Guest Editor, special issue of *Probabilistic Engineering Mechanics*, entitled
“Probability and Materials”
- 1997-2001 Editor of the ASME Applied Mechanics Division newsletter
- 1996- Reviewed >400 papers for structures and mechanics journals

Service to profession – *committee membership*

ASCE Engineering Mechanics Institute (EMI)

- 1998- EMI Probabilistic Methods Committee:
Past Chair (2019-2020)
Chair (2017-2019)
Vice Chair (2016-2017)
Control Group Member (2014-2016)
Member (1998-present)
- 2020- Member-at-Large, US Association for Computational Mechanics
Female Research Group
- 2018-2020 ASCE EMI Awards Committee
- 2016,19,20 ASCE EMI Nominating Committee
- 2017-2020 ASCE Huber Awards Selection Committee
- 2011-2014 ASCE Engineering Mechanics Institute Board of Governors
- 2007-2012 Chair, EMI Communications Committee
- 2003-2007 News Correspondent, Engineering Mechanics Division

International Association of Structural Safety and Reliability (IASSAR)

- 2018- IASSAR Executive Board
- 2001- Member

Civil Engineering Risk and Reliability Association (CERRA)

- 2019- CERRA Board
- 2011- Member

ASME Applied Mechanics Division

- 2000-2008 Vice-Chair/co-founder, Committee on Uncertainty and Probabilistics

Service to profession – conference organization & participation

- 2012- Annual Mach Conference, held in Annapolis MD with about 225 participants
 Co-Chair, Mach 2021 Conference, April 7-9, 2021
 Co-Chair, Mach 2020 Conference, April 1-3, 2020
 Chair, Mach 2019 Conference, April 3-5, 2019
 Chair, Mach 2018 Conference, April 4-6, 2018
 Chair, Mach 2017 Conference, April 5-7, 2017
 Chair, Mach 2016 Conference, April 6-8, 2016
 Chair, Mach 2015 Conference, April 8-10, 2015
 Chair, Mach 2014 Conference, April 9-11, 2014
 Chair, Mach 2013 Conference, April 10-12, 2013
- 2021 Co-organizer, HEMI Workshop on AI for Materials in Extreme Conditions, January 13-15, 2021, virtual
- 2018-2019 Track Chair on Probabilistic Methods & Structural Health Monitoring, ASCE EMI Conference, June 19-21, 2019 in Pasadena, CA
- 2018-2019 Co-organizer, USACM Workshop on UQ in Computational Solid & Structural Materials Modeling, January 17-18, 2019 in Baltimore, MD
- 2010-2019 International Scientific Committee, Annual ASCE Engineering Mechanics Institute (EMI) Conference
- 2005-2019 International Scientific Committee of the International Conference on Structural Safety & Reliability, held every 4 years
- 2004-2005 Organizer and Chair, NSF-funded Workshop *Probability & Materials: from Nano- to Macro-scale*, Johns Hopkins University
- 2001-2002 Scientific Committee – 4th International Conference on Computational Stochastic Mechanics, Corfu, Greece
- 2009 Invited participant, *Women's International Research Engineering Summit (WIRES)*, Barcelona, Spain
- 2007 Invited participant, *Validating Damage Evolution Models for Composite Materials*, Los Alamos National Laboratory, Los Alamos, NM
- 2003 Invited participant, *1st International Symposium on Nanotechnology in Construction*, Glasgow, Scotland
- 2003 Invited participant, *NSF-FHWA Workshop on Imaging and Simulation of Concrete Microstructure (Nano to Mesoscale)*, Chicago, IL
- 2000 Invited participant, *Workshop on Mitigation of Earthquake Disaster by Advanced Technologies*, Los Angeles, CA
- 1999 Invited participant, NAE Symposium *Frontiers of Engineering*, Irvine, CA
- 1997 Invited participant, *U.S./Japan Workshop on Stochastic Simulation*, Kyoto, Japan

Service to profession – recent conference symposium organization

- 2021 “Physics-Based Data-Driven Modeling and Uncertainty Quantification in Computational Materials Science and Engineering,” US National Congress on Computational Mechanics, Chicago, IL
- 2021 “Stochastic modeling of damage and fracture of heterogeneous materials,” 13th Intl. Conf. on Structural Safety and Reliability, Shanghai, China (co-organized with J. Le)

- 2020 "Sensitivity Analysis and Uncertainty Quantification in Materials Modeling," 10th Intl. Conf. on Multiscale Materials Modeling, Baltimore, MD (co-organized with M. Shakiba, P. Geubelle, X. Zhang)
- 2019 "Stochastic Methods and Data-Driven Approaches in Computational Mechanics of Random Materials," ASCE EMI Conference, Pasadena, CA (co-organized with J. Guillemot, M. Shields, K. Teferra)
- 2019 "Stochastic Methods in Computational Mechanics of Random Materials," US National Congress on Computational Mechanics, Austin, TX (co-organized with J. Guillemot, M. Shields, K. Teferra)
- 2018 "Stochastic computation of damage and fracture of heterogeneous materials," 13th World Congress on Computational Mechanics, New York, NY (co-organized with J. Le)
- 2018 "Stochastic modeling and uncertainty quantification," 13th World Congress on Computational Mechanics, New York, NY (co-organized with J. Guillemot, M. Shields, K. Teferra)
- 2018 "Stochastic Methods in Computational Mechanics of Random Materials," ASCE EMI Conference, Boston, MA (co-organized with J. Guillemot, M. Shields, K. Teferra)
- 2017 "Probabilistic mechanics in damage, fracture and failure," *EMI2017: ASCE Engineering Mechanics Institute Conference*, San Diego, CA (co-organized with J. Le).
- 2017 "Stochastic Methods in Computational Mechanics of Random Materials," 14th U.S. National Congress on Computational Mechanics, Montreal, Canada (co-organized with M. Shields, K. Teferra, J. Guillemot).
- 2016 "Characterization, simulation, and modeling of random heterogeneous materials", *2016 ASCE PMC Conference*, Nashville, TN (co-organized with M. Shields and J. Guillemot)
- 2015 "Stochastic Methods in Computational Mechanics of Random Materials", *13th US National Congress on Computational Mechanics*, San Diego, CA (co-organized with J. Guillemot and M. Shields)

Service to profession – proposal review and program evaluations

- 2020- Advisory Committee, Department of Civil and Environmental Engineering at Princeton University
- 2018- Advisory Committee, Center for Research Excellence on Dynamically Deformed Solids (CREDDS) at Texas A&M University
- 2017 External reviewer for assessment of the academic programs in the Department of Civil, Environmental, and Geo- Engineering (CEGE) at the University of Minnesota
- 1999- Served on >20 NSF panel reviews since 1999, 2 National Academy of Science panels for AFOSR, and performed multiple individual proposal reviews for AFOSR, ARO, and ONR

Current and past professional membership

- American Society of Civil Engineers
 American Society of Mechanical Engineers

American Ceramic Society
The Minerals, Metals & Materials Society
Society of Engineering Science
Society of Women Engineers
American Institute of Aeronautics and Astronautics
American Society for Engineering Education
Sigma Xi Scientific Research Society
Chi Epsilon Honor Society

Recent service to Johns Hopkins University

2015- Chair, Department of Civil & Systems Engineering
2021- Director, Center for Materials in Extreme Dynamic Environments
2012- Associate Director, Hopkins Extreme Materials Institute
2014-2017 Whiting School of Engineering Master Mentor
2008-2015 Director, Modeling Complex Systems IGERT program
2014-2015 Chair, Civil Engineering faculty search committee
2009-2012 Director of Graduate Studies, Civil Engineering
2013-2014 HEMI/ME faculty search committee
2013 WSE Dean's search committee
2008-2011 JHU Faculty Committee on Admissions
2009-2011 Whiting School of Engineering Graduate Committee
2009-2015 Whiting School of Engineering MSEM Program Committee
2009-2015 Advisor, JHU Chapter of the Society for Women Engineers
2009-2010 Krieger School of Arts & Sciences Dean search committee

PUBLICATIONS

Journal publications under review

- 1 Bhaduri, A., Meyer, C.S., Gillespie, J.W., Haque, B.Z., Shields, M.D., Graham-Brady, L. (2021). "A probabilistic modeling framework for composite plate penetration models under projectile impact," submitted.
- 2 Bhattacharjee, A., Hurley, R., Graham-Brady, L. (2021). "Predicting high rate granular transition and fragment statistics at the onset of granular flow for brittle ceramics," submitted.
- 3 Bhaduri, A., Gupta, A., Olivier, A., Graham-Brady, L. (2021). "An efficient optimization based microstructure reconstruction approach with multiple loss functions," submitted

Refereed journal publications

- 4 Bhattacharjee, A., Bhaduri, A., Hurley, R., Graham-Brady, L. (2021). "Failure modelling and sensitivity analysis of ceramics under impact," *ASME Journal of Applied Mechanics*, accepted.
- 5 Cil, M. B., Zeng, Q., Hurley, R. C., Graham-Brady, L. (2020). "An integrative model for the dynamic behavior of brittle materials based on microcracking and breakage mechanics," *Journal of the Dynamic Behavior of Materials*, in press, doi: 10.1007/s40870-020-00251-x.

- 6 Bhaduri, A., Brandyberry, D., Shields, M., Geubelle, P., Graham-Brady, L. (2020). "On the usefulness of gradient information in surrogate modeling: Application to uncertainty propagation in composite material models," *Probabilistic Engineering Mechanics*, 60,103024.
- 7 Bhaduri, A., Gardner, J., Abrams, C., Graham-Brady, L. (2020). "Free energy calculation using space filled design and weighted reconstruction: A modified single sweep approach," *Molecular Simulations*, 46(3):193-206.
- 8 Cil, M., Hurley, R., Graham-Brady, L. (2020). "Constitutive Model for Brittle Granular Materials Considering Competition between Breakage and Dilation," *Journal of Engineering Mechanics*, 146(1): 04019110.
- 9 Saouma, V., Hariri-Ardebili, M.A., Graham-Brady, L., Salamon, J. (2020). "Stochastic Analysis of Concrete Dams with Alkali Aggregate Reaction," *Cement and Concrete Research*, 132: 106032.
- 10 Teferra, K. & Graham-Brady L. (2019). "The maximum value distribution of response quantities in computational homogenization," *Journal of Engineering Mechanics*, 145(5): 06019002.
- 11 Huq, F., Liu, J., Tonge, A., Graham-Brady, L. (2019). "A micromechanics based model to predict micro-crack coalescence in brittle materials under dynamic compression," *Engineering Fracture Mechanics*, 217: 106515.
- 12 Cil, M., Hurley, R., Graham-Brady, L. (2019). "A rate-dependent constitutive model for brittle granular materials based on breakage mechanics," *Journal of the American Ceramics Society*, 102(9): 5524-5534.
- 13 Teferra, K. & Graham-Brady, L. (2018). "A random field-based method to estimate convergence of apparent properties in computational homogenization," *Computer Methods in Applied Mechanics and Engineering*, 330: 253-270.
- 14 Cereceda, D., Kats, D., Daphalapurkar, N., Graham-Brady, L. (2018). "A micro-mechanical modeling approach for dynamic fragmentation in brittle multi-phase materials," *International Journal of Solids & Structures*, 134: 116-129. doi: [10.1016/j.ijsolstr.2017.10.026](https://doi.org/10.1016/j.ijsolstr.2017.10.026).
- 15 Bhaduri, A. & Graham-Brady, L. (2018). "An efficient adaptive sparse grid collocation method through derivative estimation," *Probabilistic Engineering Mechanics*, 51:11-22.
- 16 Bhaduri, A., He, Y., Shields, M., Graham-Brady, L., Kirby, R.M. (2018). "Stochastic collocation approach with adaptive mesh refinement for parametric uncertainty analysis," *Journal of Computational Physics*, 371: 732-750.
- 17 Cereceda, D., Graham-Brady, L., Daphalapurkar, N. (2017). "Modeling dynamic fragmentation of heterogeneous structural materials," *International Journal of Impact Engineering*, 99:85-101.
- 18 Huq, F., Brannon, R. & Graham-Brady, L. (2016). "An Efficient Binning Scheme with Application to Statistical Crack Mechanics," *International Journal for Numerical Methods in Engineering*, 105(1): 33-62.
- 19 Liu, J. & Graham-Brady, L. (2016). "Perturbation-based surrogate models for dynamic failure of brittle materials in a multi-scale and probabilistic context," *International Journal for Multiscale Computational Engineering*, 14(3): 273-290.

- 20 Liu, J. & Graham-Brady, L. (2016). "Anisotropic Damage-Compliance Relationships for Brittle Materials under Compression," *International Journal of Solids & Structures*, 100-101: 151-168.
- 21 Hu, G., Liu, J., Graham-Brady, L., Ramesh, K.T. (2015). "A 3D Mechanistic Constitutive Model for Brittle Materials Containing Evolving Flaw Distributions under Dynamic Multiaxial Loading," *Journal of the Mechanics and Physics of Solids*, 78: 269-297.
- 22 Teferra, K. & Graham-Brady, L.L. (2015). "Grain growth tessellation models for polycrystalline microstructures," *Computational Materials Science*, 102: 57-67.
- 23 Mayercsik, N.P., Shaeffer, M., Graham-Brady, L.L. & Kurtis, K.E. (2015). "Analysis of Portland Cement mortar under impact: a combined materials characterization, micromechanics modeling, and dynamic testing approach," *Cement and Concrete Research*, 73: 190-206.
- 24 Graham-Brady, L.L., Katcoff, C.Z., Mayercsik, N.P., Kurtis, K.E. (2015). "Micromechanical Model and Associated Validation for Dynamic Failure of Brittle Materials Containing Pores and Slit-like Flaws," *Journal of Engineering Mechanics*, ASCE, 141(10): 04015040.
- 25 Roozbahani, M.R., Graham-Brady, L.L., Frost, J.D. (2014). "Mechanical trapping of fine particles in a medium of mono-sized randomly packed spheres," *International Journal for Numerical and Analytical Methods in Geomechanics*, 38(17): 1776-1791.
- 26 Katcoff, C.A. & Graham-Brady, L.L. (2014). "Modeling Dynamic Brittle Behavior of Materials with Circular Flaws or Pores," *International Journal of Solids & Structures*, 51: 754-766.
- 27 Zeinoddini, V.M., Graham-Brady, L.L., Schafer, B.W. (2013). "Imperfection sensitivity and reliability using simple bar-spring models for stability," *International Journal of Structural Stability and Dynamics*, 13(3): Art.No. 1250075.
- 28 Daphalapurkar, N.P., Ramesh, K.T., Graham-Brady, L.L., Molinari, J.F. (2011). "Predicting variability in the dynamic failure strength of brittle materials considering preexisting flaws," *Journal of the Mechanics & Physics of Solids*, 59(2): 297-319.
- 29 Tootkaboni, M. & Graham-Brady, L. (2010). "A Multi-scale Spectral Stochastic Method for Homogenization of Multi-Phase Periodic Composites with Random Material Properties," *International Journal of Numerical Methods in Engineering*, 83(1): 59-90.
- 30 Tootkaboni, M. & Graham-Brady, L. (2010). "Stochastic direct integration schemes for dynamic systems subjected to random excitation," *Probabilistic Engineering Mechanics*, 25(2): 163-171.
- 31 Acton, K. & Graham-Brady, L. (2010). "Elasto-plastic mesoscale homogenization of composite materials," *Journal of Engineering Mechanics*, ASCE, 136(5): 613-624.
- 32 Graham-Brady, L. (2010). "Statistical characterization of meso-scale uniaxial compressive strength in brittle materials with randomly occurring flaws," *International Journal of Solids and Structures*, 47 (18-19): 2398-2413.
- 33 Acton, K. & Graham-Brady, L. (2009). "Mesoscale modeling of plasticity in composites," *Computer Methods in Applied Mechanics & Engineering*, 198(9-12): 920-932.
- 34 Tootkaboni, M., Graham-Brady, L., Schafer, B. (2009). "Geometrically nonlinear behavior of structural systems with random material property: an asymptotic spectral

- stochastic approach,” *Computer Methods in Applied Mechanics & Engineering*, 198(37-40): 3173-3185.
- 35 Graham-Brady, L. & Xu, X. Frank (2008). “Stochastic morphological modeling of random multiphase materials,” *Journal of Applied Mechanics*, ASME, 75(6): 0610011-06100110.
- 36 Tregger, N., Corr, D., Graham-Brady, L., Shah, S. (2007). “Modeling mesoscale uncertainty for concrete in tension,” *Computers & Concrete*, 4: 347-362.
- 37 Corr, D.J., Accardi, M., Graham-Brady, L., Shah, S. (2006). “Digital image correlation analysis of interfacial debonding properties and fracture behavior in concrete,” *Engineering Fracture Mechanics*, 74(1,2): 109-121.
- 38 Schafer, B.W. & Graham-Brady, L. (2006). “Stochastic postbuckling of frames using Koiter’s method,” *International Journal of Structural Stability and Dynamics*, 6(3): 333-358.
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Teferra, K. & Graham-Brady, L., (2014). "Optimization and stochastic simulation of random tessellation models to represent digitally reconstructed microstructures (Abstract Only)," *EMI 2014: ASCE Engineering Mechanics Institute Conference*, Hamilton, ON, Canada, August 5-8, 2014.

PRESENTATIONS

Plenary/keynote lectures

- “Lessons from a Successful Large DoD Center in the time of Covid,” *National Academies' Defense Materials, Manufacturing and its Infrastructure Standing Committee (DMMI) Workshop on Materials Science and Engineering in A Post-Pandemic World*, December 7-9, 2020.
- “Methods for the correction of epistemic resolution error through data collection process simulations,” *TMS 2020: 149th Annual Meeting and Exhibition*, San Diego, CA, February 23-27, 2020.
- “Uncertainty propagation from materials characterization to modeling,” *EMI International Conference*, Shanghai, China, November 2-4, 2018.
- “Uncertainty in the Context of Materials by Design: Key Roles for Stochastic Mechanics,” *EMI2017: ASCE Engineering Mechanics Institute Conference*, San Diego, CA, June 7, 2017.
- “The role of stochastic simulation in mechanics of materials at multiple scales,” *FrontUQ: Frontiers of Uncertainty Quantification Workshop*, Munich, Germany, September 7, 2017.
- “Recent developments on a multi-mechanism model of brittle dynamic failure,” 10th *ICACM US-France Symposium: Dynamic Damage & Fragmentation*, Shalimar, FL, May 17-19, 2017.
- “Stochastic simulation as a basis for optimizing microstructural characterization protocols,” Predictive Multiscale Materials Modelling workshop, Isaac Newton Institute, Cambridge, UK, December 1-4, 2015.
- “Upscaling crack propagation and random interactions in brittle materials under dynamic loading,” *IUTAM Symposium on Multiscale Problems in Stochastic Mechanics*, Karlsruhe, Germany, June 26, 2012.
- “Computational simulation of composite materials with random microstructure,” workshop on *Validating Damage Evolution Models for Composite Materials*, Los Alamos National Laboratory, Los Alamos, NM, August 14-16, 2007.
- “Microstructural simulation for random composite materials: an overview,” *NSF International Workshop: Microstructure and Micromechanics of Stone Based Infrastructure Materials*, Blacksburg, VA, October 5, 2006.
- “Microstructural stochastic simulation,” *NSF-FHWA Workshop on Imaging and Simulation of Concrete Microstructure (Nano to Mesoscale)*, Northwestern University, Evanston, IL, July 28, 2003.
- “Moving-window representation of interfacial debonding in concrete,” *1st International Symposium on Nanotechnology in Construction*, Glasgow, Scotland, June 24, 2003.

“Stochastic finite element analysis using variability response functions,” *U.S.-Japan Workshop/Seminar on Stochastic Simulation for Civil Infrastructural Systems*, Kyoto, Japan, November, 1997.

Invited seminars

“Surrogate modeling approaches to enable uncertainty quantification in mechanics applications,” Structures Seminar, Department of Civil & Environmental Engineering, University of Illinois at Urbana-Champaign, September 23, 2019.

“Efficient uncertainty quantification and sensitivity analysis using surrogate models, with applications to mechanics,” Center for Informatics & Computational Science Seminar Series, Notre Dame University, September 25, 2019.

“Uncertainty propagation in mechanics and materials by design based on surrogate model development,” Department of Applied Mathematics and Statistics Seminar Series, Johns Hopkins University, April 18, 2019.

“Efficient representation and analysis of structural materials through surrogate modeling,” Department of Civil Engineering Seminar Series, Tongji University, November 5, 2018.

“Surrogate models: a potential foundation for simultaneous structures/materials design,” Department of Civil & Environmental Engineering Seminar Series, Carnegie Mellon University, October 12, 2018.

“Breaking down language barriers in materials-by-design: a framework to enable uncertainty quantification,” Department of Civil & Environmental Engineering Seminar Series, University of Virginia, March 16, 2018.

“Stochastic mechanics: further empowerment for materials-by-design,” Department of Civil & Environmental Engineering Seminar Series, Northwestern University, November 29, 2017.

“Probabilistic Multi-Scaling as a way to Capture Key Localizations in Material Performance,” Department of Mechanical & Aerospace Engineering Seminar Series, Arizona State University, March 24, 2017.

“From micro-scale variations to structural failure using stochastic mechanics,” Department of Civil Engineering and Engineering Mechanics Seminar Series, Columbia University, October 4, 2016.

“What we don’t know can hurt us: the case for stochastic mechanics,” Department of Civil Engineering Seminar Series, Northeastern University, February 29, 2016.

“Failure starts small: the role of stochastic mechanics in multi-scale modeling,” Warren Lecture Series, University of Minnesota, March 13, 2015.

“Breaking Up Fast: Failure of Brittle Materials at High Strain Rates,” Civil Engineering Seminar, University of Pittsburgh, March 8, 2014.

“Cracking Up: Micromechanical & Probabilistic Modeling of Dynamic Failure in Brittle Materials from Concrete to Ceramics,” Structural Mechanics Seminar Series, Georgia Institute of Technology, Atlanta, GA, April 19, 2013.

- “Probabilistic Modeling of Dynamic Failure in Cementitious Materials,” Civil Engineering Seminar Series, Northwestern University, Evanston, IL, April 23, 2013.
- “Probabilistic characterization of material microstructure,” Mechanical Engineering seminar, Johns Hopkins University, Baltimore, MD, September 25, 2008.
- “Material property simulation based on probabilistic characterization of random microstructure,” Civil Engineering seminar, Cornell University, Ithaca, NY, March 4, 2008.
- “Computational modeling of composite materials with random microstructure,” part of the UCSD Structural Engineering Distinguished Lecture Series, University of California at San Diego, San Diego, CA, November 18, 2005.
- “Simulation and characterization of composite materials with random microstructure,” JHU Applied Mathematics and Statistics Department Seminar, Johns Hopkins University, December 14, 2005.
- “Simulation techniques for random material microstructures,” Department of Civil and Environmental Engineering seminar, Columbia University, New York, NY, November 4, 2004.
- “Analysis of materials with random microstructure,” GWISE funded lecture to the Department of Civil Engineering, University of Michigan, Ann Arbor, MI, February 20, 2004.
- “Stochastic simulation of materials with random microstructure,” Department of Civil Engineering seminar, Purdue University, W. Lafayette, IN, February 11, 2003.
- “Stochastic simulation of random material microstructure,” Civil Engineering Department seminar, Northwestern University, Evanston, IL, November 8, 2002.
- “Computational analysis of random material microstructures via stochastic simulation,” Sandia National Labs, Albuquerque, NM, December 13, 2001.
- “Micromechanics of random composite materials,” Mechanical Engineering Department seminar, Johns Hopkins University, Baltimore, MD, March 3, 2001.
- “Stochastic finite element methods,” Engineering Physics seminar, Washington & Lee University, Lexington, VA, March 9, 2000.
- “Stochastic finite element analysis in structural engineering,” Department of Civil Engineering seminar, University of Maryland, College Park, MD, November 17, 1997.
- “Introduction of multimedia instruction in ENGR 205: Statics”, UVA Teaching Resource Center workshop, November 4, 1998.

Presentations at conferences, workshops, program reviews (last 5 years)

- “Impact models for ceramics incorporating fragmentation and subsequent breakage,” *44th Annual International Conference and Exposition on Advanced Ceramics and Composites*, Daytona Beach, FL, January 28-31, 2020.

- “Fragment size characterization for granular flow in highly damaged ceramics,” *ECCOMAS Conference of Computational Methods in Multi-scale, Multi-uncertainty and Multi-physics Problems*, Porto, Portugal, July 16-18, 2019.
- “Predicting probability of penetration for continuum plain-weave composite plate model under projectile impact,” *ASCE EMI Conference (EMI 2019)*, Pasadena, CA, June 18-21, 2019.
- “Surrogate modeling and model selection in irreducible high dimensions with small sample size,” *13th International Conference on Applications of Statistics and Probability in Civil Engineering*, Seoul, Korea, May 26-30, 2019.
- “Uncertainty propagation of composite models using an efficient response surface algorithm,” *8th Conference on Computational Stochastic Mechanics*, Paros, Greece, June 10-13, 2018.
- “Uncertainty propagation in materials characterization,” AFRL CEIMM Final Review Meeting, Baltimore, MD, April 30, 2018.
- “A micro-mechanical modeling approach for dynamic fragmentation in brittle multi-phase materials,” *EMI 2017: ASCE Engineering Mechanics Institute Conference*, San Diego, CA, June 4-7, 2017.
- “FEM based uncertainty quantification for computational models of fiber-reinforced composite materials,” *12th International Conference on Structural Safety and Reliability*, Vienna, Austria, August 6-10, 2017.
- “Quantification of Error and Uncertainty in Materials Characterization,” AFRL CEIMM Annual Review Meeting, Dayton, OH, May 8, 2017.
- “Modeling dynamic fragmentation of concrete under high strain-rate loading,” *FramCos 9, the 9th International Conference on Fracture Mechanics of Concrete and Concrete Structures*, Berkeley, CA, May 30-June 2, 2016.
- “Upscaled models of random heterogeneous materials via probabilistic characterization of local structure-property relationships,” *IUTAM Symposium on Integrated Computational Structure-Material Modeling of Deformation & Failure Under Extreme Conditions*, Baltimore, MD, June 20-22, 2016.
- “Stochastic Simulation-based Uncertainty Quantification & Optimization of Materials Characterization,” AFRL CEIMM Annual Review Meeting, Urbana, IL, May 3, 2016.
- “Efficient stochastic simulation of dynamic brittle strength using a random perturbation-based micromechanics model,” *12th International Conference on Applications of Statistics and Probability in Civil Engineering, ICASP12*, Vancouver, Canada, July 12-15, 2015.
- “Probabilistic characterization and stochastic simulation of 3D polycrystalline microstructures,” AFRL CEIMM Annual Review Meeting, Santa Barbara, CA, May 12, 2015
- “Morphology and size sensitivity of polycrystalline microstructure response,” TMS2015: the 15th Minerals, Metals, and Materials Society Meeting, Orlando, FL, March 16, 2015.

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- “Efficient implementation of a strain-rate dependent constitutive relationship for ceramics,” *39th International Conference and Expo on Advanced Ceramics and Composites*, Daytona Beach, FL, January 28, 2015.
- “A damage-based model of dynamic strength of brittle materials accounting for crack coalescence,” *EMI 2014: ASCE Engineering Mechanics Institute Conference*, Hamilton, ON, Canada, August 7, 2014.
- “Simulating granular microstructures with random tessellations models for micromechanical analysis,” *7th International Conference on Computational Stochastic Mechanics (CSM)*, Santorini, Greece, June 16, 2014.
- “The Materials in Extreme Dynamic Environments (MEDE) CRA,” *Briefing to the ARL Weapons Materials Research Directorate Board of Directors*, Aberdeen, MD, July 1, 2013.
- “UQ and Probabilistic modeling,” *AFRL CEIMM Midyear Report*, Dayton, OH, June 12, 2013.
- “Characterization of porosity and its effects on dynamic strength of cement-based materials,” *6th Annual Conference of the ASCE Engineering Mechanics Institute (EMI2013)*, Evanston, IL, August 5, 2013.
- “Strength variability based on a stochastic damage micromechanics model,” *11th International Conference on Structural Safety and Reliability*, New York, NY, June 16-20, 2013.
- “Study of a Porous Cement/Mortar with Dynamic Modeling and Testing,” *Inaugural Mach Conference (Mach 2013)*, Annapolis, MD, April 11, 2013.