

Lori Graham-Brady

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

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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
Director, CAIMEE: Ctr. on AI for Materials in Extreme Environments (2022-)
Assoc. Director, HEMI: Hopkins Extreme Materials Institute (2012-)
Director (2021-22), Assoc. Director (2012-20), CMEDE: Center for Materials in Extreme Dynamic Environments
Chair, Civil & Systems Engineering (2015-21)
Secondary Appointment, Mechanical Engineering
Secondary Appointment, Materials Science and Engineering
- 1996-2000 *University of Virginia*
Assistant Professor, Civil Engineering
- 1990-92 *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

Surrogate Models and Machine Learning for Mechanics; AI-driven Materials Design; 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

- 2022-2023 *ML-augmented Physics-Based Models*, Army Research Laboratory, subcontract to Georgia Institute of Technology (JHU PI).
- 2022-2023 *Multi-modal Data-driven Design of materials for Extreme Environments*, Army Research Laboratory, subcontract to Carnegie Mellon University (JHU PI)
- 2021-2023 *Materials in Extreme Dynamic Environments Plus (MEDE+)*, Army Research Laboratory (Director/PI).
- 2012-2022 *A Collaborative Program for the Multiscale Modeling and Design of Materials for Extreme Dynamic Environments (CMEDE)*, Army Research Laboratory (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

- 2015-2021 *Chair, Civil and Systems Engineering*
 The Chair of Civil and Systems Engineering oversees this department, which at the time had about 12 JHU faculty, 70 graduate students and postdoctoral scholars, and 50 undergraduates. The Department budget was approximately \$5.5 million per year, and the Chair managed a team of 6 staff members that supported the financial wellbeing of the Department, grants preparation and administration, coordination of academic programs, external communications, and activities that fostered a positive student experience. An external advisory board consisting of members from both industry and academia assisted the Chair in identifying possible future directions and supporting initiatives that helped the Department in its educational mission. The Chair also coordinated with the Dean's Office to ensure that all departmental operations were consistent with Whiting School of Engineering operating procedures, and that the Department's vision aligned with the School's strategic plan.
- 2022- *Director, Center on AI for Materials in Extreme Environments (CAIMEE)*
 The JHU Center on AI for Materials in Extreme Environments includes 12 JHU faculty and 20 JHU graduate students and postdoctoral scholars. External partners with CAIMEE include the University of Delaware and Morgan State University. The Center has attracted over \$15 million in external funding. The Director oversees 4 staff (administered under HEMI) that manage the operations of CAIMEE.
- 2012- *Associate Director, Hopkins Extreme Materials Institute (HEMI)*
 The Associate Director works with the Director and Executive Program Director to help oversee this Institute with more than 40 JHU faculty, more than 300 current and past JHU graduate students and postdoctoral scholars, and partnerships with faculty and scientists at more than 30 universities and organizations all over the world. The Institute annual budget is currently more than \$20 million per year, requiring significant coordination with JHU administration, partner organizations and relevant external funding agencies. The Associate Director helps to oversee 16 staff that work in HEMI and leads many of the HEMI community-building

activities, including initiating and serving for 9 years as Chair for the Mach Conference, an annual conference series initiated in 2013, which attracts over 200 participants each year.

2012-2022 *Director (2021-2022); Associate Director (2012-2020), Center for Materials in Extreme Dynamic Environments (CMEDE)*

The ARL-funded CMEDE had a cumulative budget of over \$87M over the 10 years of the program. JHU was the lead organization, providing oversight for funded research involving ~100 faculty investigators at 25 organizations, over 200 Ph.D. students, postdoctoral scholars and M.S. students, and over 200 undergraduate interns, many of which come from minority-serving institutions. The Director and Associate Director oversaw the research directions of the program, managed and allocated funds to reflect evolving research priorities, ensured transition of new materials and codes to ARL, and drove collaborative activities that connected this large interdisciplinary research center.

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.

MENTORING AND STUDENT ADVISING

Ph.D. student supervision

In progress Ashwini Gupta (5th year)
 Indrashish Saha (2nd year)
 Ozge Ozbayram (2nd year)

2022 Noah Wade (Civil & Systems Engineering – *now a postdoctoral scholar at JHU*)

2021 Amartya Bhattacharjee (Civil Engineering – *now at Veryst Consulting*)

2019 Anindya Bhaduri (Civil Engineering – *now at GE*)

2017 Farah Huq (Civil Engineering – *now at Siemens*)

2015 Junwei Liu (Civil Engineering – *now at Apple*)

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

- 2022- George Pasparakis
2022- Noah Wade
2021-2022 Amartya Bhattacharjee (*Veryst Consulting*)
2019-2021 Anindya Bhaduri (*Research Engineer, General Electric*)
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

- 2020-21 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

2022	Connor Neugebauer (Mt. St. Joseph's High School) Brian Wiseman (Mt. St. Joseph's High School)
2021	Adesola Adelegan (Charles Herbert Flowers High School)
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)
560.462	Failure Mechanics in Materials 1 semester (2 students)
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

2000-2023	73 Graduate Board Oral examination committees
2000-2023	7 Ph.D. proposal committees
2000-2023	46 Departmental Qualifying Exam committees
1996-2023	50 Ph.D. defense committees

Other Mentoring

2014-	Mentor for 4 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*

- 2022- Editor, *Mechanics of Materials*
- 2014- Associate Editor, *ASCE Journal of Engineering Mechanics*
- 2019- Editorial Board, *Jnl. of Theoretical, Computational & Applied Mechanics*
- 2017- Editorial Board, *Structural Safety*
- 2007- Editorial Board, *Probabilistic Engineering Mechanics*
- 1998- Editorial Board, *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)

- 2019- Task committee for Updating the EMI Strategic Plan
- 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- EMI Machine Learning Committee
- 2018-20 EMI Awards Committee
- 2016,19-21 EMI Nominating Committee
- 2017-20 ASCE Huber Awards Selection Committee
- 2011-14 EMI Board of Governors
- 2007-12 Chair, EMI Communications Committee
- 2003-07 News Correspondent, Engineering Mechanics Division

International Association of Structural Safety and Reliability (IASSAR)

- 2018- IASSAR Executive Board
 - Treasurer (2020-)
- 2001- Member

Civil Engineering Risk and Reliability Association (CERRA)

- 2019- CERRA Board
- 2011- Member

US Association for Computational Mechanics (USACM)

- 2020- Member-at-Large, USACM Female Research Group
- 2022 Member, Gallagher Awards Committee

ASME Applied Mechanics Division

- 2000-08 Vice-Chair/co-founder, Committee on Uncertainty and Probabilistics

Service to profession – conference organization & participation

- 2022 Participant, NSF Workshop on Future Scientific Instruments for Alloys, Amorphous, and Composite Materials Research, November 7-8, 2022, virtual.
- 2012-2021 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
- 2021-2023 Scientific Organizing Committee, 17th US National Congress on Computational Mechanics, July 23-27, 2023, Albuquerque, NM
- 2021-2023 International Scientific Board, 14th International Symposium on Continuum Models and Discrete Systems, June 25-30, 2023, Ile d'Oleron, France
- 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
- 2010-2023 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

- 2022 “AI for Materials in Extreme Conditions,” 2022 Mach Conference, virtual (co-organized with J. El-Awady, K.T. Ramesh)
- 2022 “Uncertainty Quantification, Sensitivity Analysis, and Machine Learning in Materials Modeling,” 10th International Conference on Multiscale Materials Modeling, Baltimore, MD (co-organized with P. Geubelle, J. Kermode, J. Knap, M. Koslowski, M. Shakiba, M. Shields, X. Zhang)
- 2022 “Physics-Based Data-Driven Modeling and Uncertainty Quantification in Computational Materials Science and Engineering,” ASCE EMI Conference, Baltimore, MD (co-organized with J. Guilleminot, M. Shields, K. Teferra)
- 2022 “Stochastic modeling of damage and fracture of heterogeneous materials,” 13th Intl. Conf. on Structural Safety and Reliability, Shanghai, China (co-organized with J. Le)
- 2022 “Physics-Based Data-Driven Modeling and Uncertainty Quantification in Computational Materials Science and Engineering,” 14th World Congress on Computational Mechanics, Yokohama, Japan (co-organized with J. Guilleminot, M. Shields, K. Teferra)
- 2021 “Physics-Based Data-Driven Modeling and Uncertainty Quantification in Computational Materials Science and Engineering,” US National Congress on Computational Mechanics, Chicago, IL
- 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. Guilleminot, 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. Guilleminot, 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. Guilleminot, M. Shields, K. Teferra)
- 2018 “Stochastic Methods in Computational Mechanics of Random Materials,” ASCE EMI Conference, Boston, MA (co-organized with J. Guilleminot, 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. Guilleminot).

- 2016 "Characterization, simulation, and modeling of random heterogeneous materials", *2016 ASCE PMC Conference*, Nashville, TN (co-organized with M. Shields and J. Guilleminot)
- 2015 "Stochastic Methods in Computational Mechanics of Random Materials", *13th US National Congress on Computational Mechanics*, San Diego, CA (co-organized with J. Guilleminot and M. Shields)

Service to profession – *proposal review and program evaluations*

- 2020- Advisory Committee, Department of Civil and Environmental Engineering at Princeton University
- 2018- Scientific 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 Ceramic Society (ACerS)
 American Institute of Aeronautics and Astronautics (AIAA)
 American Society of Civil Engineers (ASCE)
 American Society for Engineering Education (ASEE)
 American Society of Mechanical Engineers (ASME)
 Chi Epsilon Honor Society
 Society of Engineering Science (SES)
 Society of Women Engineers (SWE)
 Sigma Xi Scientific Research Society
 The Minerals, Metals & Materials Society (TMS)
 US Association for Computational Mechanics (USACM)

Recent service to Johns Hopkins University

- 2022- Director, Center on AI for Materials in Extreme Environments
- 2021-2022 Director, Center for Materials in Extreme Dynamic Environments
- 2012- Associate Director, Hopkins Extreme Materials Institute
- 2012-2020 Associate Director, Center for Materials in Extreme Dynamic Environments
- 2015-2021 Chair, Department of Civil & Systems Engineering
- 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

Service to Community

2019- Executive Board, Baltimore Lab School, Baltimore, MD.

PUBLICATIONS

Journal publications under review

- 1 Wade, N. & Graham-Brady, L. (2023). "Estimating Microstructural Property Distributions from Image Data Using a Bayesian Framework," submitted.
- 2 Yaghoobi, M., Stopka, K.S., McDowell, D.L., Graham-Brady, L., Teferra, K. (2023). "Effect of sample size on the maximum value distribution of fatigue driving forces in metals and alloys," submitted.
- 3 Gupta, A., Bhaduri, A., Graham-Brady, L. (2023). "Accelerated multiscale mechanics modeling in a deep learning framework," submitted.

Refereed journal publications

- 4 Prameela, S.E., Pollock, T., Raabe, D., Meyers, M.A., Aitkaliyeva, A., Chintersingh, K.L., Cordero, Z., Graham-Brady, L. (2023). "Materials for Extreme Environments," *Nature Reviews Materials*, 8(2): 81-88.
- 5 Maruyama, B., Hattrick-Simpers, J., Musinski, W., Graham-Brady, L., Li, K., Hollenbach, J., Singh, A., Taheri, M.L. (2022). "AI and Materials Research for Coupled Extremes," *MRS Bulletin*, 47(11): 1154-1164.
- 6 Bhaduri, A., Gupta, A., Graham-Brady, L. (2022). "Stress field prediction in fiber-reinforced composite materials using a deep learning approach," *Composites Part B*, 238: 109879.
- 7 Bhattacharjee, A., Hurley, R., Graham-Brady, L. (2022). "Fragmentation and granular transition of ceramics for high rate loading," *Journal of the American Ceramic Society*, 105(5):3062-3080. *Selected for Best Paper Award
- 8 Ramesh, K.T., Graham-Brady, L., Goddard, W.A., Hurley, R.C., Robbins, M., Tonge, A.L., Bhattacharjee, A., Clemmer, J.T., Zeng, Q., Li, W., Shen, Y., An, Q., Mitra, N. (2022). "Models for the behavior of boron carbide in extreme dynamic environments," *Journal of the American Ceramic Society*, 105(5):3043-3061.
- 9 Geyer, S., Papaioannou, I., Graham-Brady, L., Straub, D. (2022). "The spatial averaging method for non-homogeneous random fields with application to reliability analysis," *Engineering Structures*, 253:113761.
- 10 Olivier, A., Shields, M., Graham-Brady, L. (2021). "Probabilistic neural networks for uncertainty quantification in data-based materials modeling," *Computer Methods in Applied Mechanics and Engineering*, 386:114079.
- 11 Bhaduri, A., Gupta, A., Olivier, A., Graham-Brady, L. (2021). "An efficient optimization based microstructure reconstruction approach with multiple loss functions," *Computational Materials Science*, 199:110709.

- 12 Bhattacharjee, A., Bhaduri, A., Hurley, R., Graham-Brady, L. (2021). "Failure modelling and sensitivity analysis of ceramics under impact," *ASME Journal of Applied Mechanics*, 88(5): 051007.
- 13 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," *ASCE Journal of Engineering Mechanics*, 147(11): 04021087.
- 14 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*, 6(4): 472-488.
- 15 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.
- 16 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.
- 17 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.
- 18 Saouma, V., Hariri-Ardebili, M.A., Graham-Brady, L. (2020). "Stochastic Analysis of Concrete Dams with Alkali Aggregate Reaction," *Cement and Concrete Research*, 132: 106032.
- 19 Teferra, K. & Graham-Brady L. (2019). "The maximum value distribution of response quantities in computational homogenization," *Journal of Engineering Mechanics*, 145(5): 06019002.
- 20 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.
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- Graham-Brady, L., Bhattacharjee, A., Cil, M. (2020). "Impact models for ceramics incorporating fragmentation and subsequent breakage (Abstract Only)," *44th Annual International Conference and Exposition on Advanced Ceramics and Composites*, Daytona Beach, FL, January 28-31, 2020.
- Graham-Brady, L. & Bhattacharjee, A. (2019). "Fragment size characterization for granular flow in highly damaged ceramics (Abstract Only)," *ECCOMAS Conference of Computational Methods in Multi-scale, Multi-uncertainty and Multi-physics Problems*, Porto, Portugal, July 16-18, 2019.
- Bhaduri, A., Graham-Brady, L., Shields, M. (2019). "Efficient surrogate modeling using gradient information (Abstract Only)," *3rd International Conference on Uncertainty Quantification in Computational Sciences and Engineering*, Crete, Greece, June 24-26, 2019.
- Bhattacharjee, A. & Graham-Brady, L. (2019). "Predicting initial fragment sizes for granular flow under dynamic fragmentation of ceramics (Abstract Only)," *ASCE EMI Conference (EMI 2019)*, Pasadena, CA, June 18-21, 2019.
- Olivier, A., Shields, M., Graham-Brady, L. (2019). "Uncovering exploitable insights from microstructures using machine learning algorithms (Abstract Only)," *ASCE EMI Conference (EMI 2019)*, Pasadena, CA, June 18-21, 2019.
- Bhaduri, A., Graham-Brady, L., Shields, M., Meyer, C., Haque, B., Gillespie, J. (2019). "Predicting probability of penetration for continuum plain-weave composite plate model under projectile impact (Abstract Only)," *ASCE EMI Conference (EMI 2019)*, Pasadena, CA, June 18-21, 2019.
- Cil, M., Hurley, R., Graham-Brady, L. (2019). "Dynamic behavior of granulated boron carbide (Abstract Only)," *7th Annual Mach Conference*, Annapolis, MD, April 3-5, 2019.

Bhattacharjee, A. & Graham-Brady, L. (2019). "Fragmentation and granular phase transition in brittle ceramics (Abstract Only)," *43rd Annual International Conference and Exposition on Advanced Ceramics and Composites*, Daytona Beach, FL, January 27-February 1, 2019.

Cil, M., Hurley, R., Graham-Brady, L. (2019). "A constitutive model for granulated ceramics based on breakage mechanics (Abstract Only)," *43rd Annual International Conference and Exposition on Advanced Ceramics and Composites*, Daytona Beach, FL, January 27-February 1, 2019.

Graham-Brady, L. & Wade N. (2018). "Uncertainty propagation from materials characterization to modeling (Abstract Only)," *EMI International Conference*, Shanghai, China, November 2-4, 2018.

Wade, N. & Graham-Brady, L. (2018). "Uncertainty quantification of data collection and data processing in materials characterization (Abstract Only)," *World Congress on Computational Mechanics*, New York, NY, July 22-27, 2018.

Cereceda, D., Arora, R., Krogstad, J.A., Jiménez, F.L., Shields, M.D., Graham-Brady, L. (2018). "Unraveling the structure-property relationships in fiber-composite materials using machine learning and global sensitivity analysis (Abstract Only)," *World Congress on Computational Mechanics*, New York, NY, July 22-27, 2018.

Bhaduri, A., Graham-Brady, L., Abrams, C. (2018). "Development of an efficient surrogate based sampling algorithm using gradient information (Abstract Only)," *ASCE EMI Conference*, Boston, MA, May 29-June 1, 2018.

Bhattacharjee, A. & Graham-Brady, L. (2018). "Analytical model of the transition of a comminuted material to granular phase and evolution of void ratio at transition (Abstract Only)," *ASCE EMI Conference*, Boston, MA, May 29-June 1, 2018.

Cil, M., Hurley, R., Graham-Brady, L. (2018). "Continuum modeling of deformation and comminution in granular ceramics under high strain rate loading (Abstract Only)," *ASCE EMI Conference*, Boston, MA, May 29-June 1, 2018.

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

- “Accelerated materials design for extreme environments using high-throughput and AI-driven approaches,” Materials Science and Engineering, University of Connecticut, February 17, 2023.
- “Surrogate models as a backbone for AI-driven materials design,” Department of Materials Science, New Jersey Institute of Technology, April 11, 2022.
- “Machine Learning and Other Surrogate Models for Solid Mechanics,” Department of Mechanical Engineering Seminar, University of Utah, February 25, 2022.
- “ML-enhanced approaches to the mechanics of multi-phase materials,” *Seminaire du Laboratoire PIMM*, CNAM Paris, June 24, 2021.

- “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)

- “ML-driven multi-scale models,” Fall Meeting of the ARL-funded HTMDEC program, College Station, TX, November 17, 2022.
- “A Deep Learning Approach to Model the Microstructure-induced Uncertainty in Multiscale Modeling,” *Society of Engineering Science Annual Technical Meeting (SES2022)*, College Station, TX, October 16-19, 2022.
- “MEDE Capstone: Overview of the Ten-Year Program”, Capstone presentation of the ARL-funded MEDE Center, Baltimore, MD, January 20, 2022.

- “Developing a vision for proposals,” Joint USACM Large-Scale TTA – EMI CMC Career Path Panel at EMI 2023, Baltimore, MD, May 31, 2022.
- “Fragmentation and granular transition of ceramics for high rate loading,” *Symposium for Best Paper Awardees in the Journal of the American Ceramics Society*, MS&T Conference, Pittsburgh, PA, October 11, 2022.
- “MEDE Overview: the last 10 years”, Fall Meeting of the ARL-funded MEDE Center, Baltimore, MD, November 20, 2021.
- “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.