Sanjay Raja Arwade
Associate Professor
Department of Civil & Environmental Engineering
University of Massachusetts, Amherst
Amherst, MA, 01003
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Employment

Professor	2016-present
Associate Professor	2011-2016
Assistant Professor	2006-2011
Civil & Environmental Engineering	University of Massachusetts, Amherst
Associate Director: Gov't Relations	2020-present
Affiliated Professor	2009-present
Wind Energy Center	University of Massachusetts, Amherst
Assistant Professor	2002 - 2006
Civil Engineering	Johns Hopkins University
Visiting Professor	
School of Construction Engineering	2014 – Pontifical Catholic Univ. of Valparaiso, Chile
Civil & Environmental Engineering	2013 – University of Perugia
Civil Engineering & Engineering Mechanics	2013 – Columbia University
Civil Engineering	2006-2008 – Johns Hopkins University
Visiting Faculty	Summer 2003
Computer Science Research Institute	Sandia National Laboratories

Education

Ph.D., Civil & Environmental Engineering 2002
Cornell University
Major Field: Structural Engineering. Minor Field: Theoretical & Applied Mechanics
Dissertation: Stochastic Characterization and Simulation of Material Microstructures with Application to Aluminum.
Advisor: Mircea Grigoriu

M.S., Civil & Environmental Engineering 1999
Cornell University
Major Field: Structural Engineering. Minor Field: Structural Mechanics
Thesis: Probabilistic Models for Aluminum Microstructure and Intergranular Fracture Analysis.
Advisor: Mircea Grigoriu

B.S.E., Civil Engineering & Operations Research 1996
summa cum laude
Princeton University
Thesis: Analysis of the Effect of Differential Support Motion on a Typical Reinforced Concrete Highway Bridge.
Advisor: George Deodatis

EIT 1997
New York State

Awards and Honors

Fellow, ASCE Engineering Mechanics Institute

Student Centered Teaching and Learning Fellow, 2017.

CEE Department Research Prize, University of Massachusetts, 2015-2016.

Lilly Teaching Fellow, University of Massachusetts, 2008-2009.

NSF New Century Scholar, selected for workshop participation, 2002.

John E. Perry Teaching Assistant Prize. Cornell University, 1997, 1998.

ACI (NJ Section) award for outstanding research in concrete structures, 1996.

Phi Beta Kappa, 1996.

Sigma Xi, 1996.

Tau Beta Pi, 1996.

Research

Research Interests

Uncertainty quantification in structural and solid mechanics: Numerous sources of system uncertainty such as material property variability and loading randomness generate response uncertainty in structural and solid mechanics problems. My interests in this area lie in developing: (1) new methods for representing the input uncertainties as random fields and generating samples of those random fields; (2) efficient methods for quantifying uncertainty in systems with large numbers of random input parameters and performing dimension reduction on such systems; (3) System reliability effects in the structural systems

Wind turbine analysis and reliability: Wind turbine research has concentrated largely on the energy-producing turbine itself, yet construction of the support structure can contribute up to 25% of the total life-cycle cost of an offshore turbine. I am working with collaborators on new methods for multi-physics, probabilistic simulation of offshore wind turbine support structures to allow designers to use quantitative risk-based approaches to design of such structures.

Probabilistic damage modeling in random heterogeneous materials: Deterministic approaches to modeling material strength neglects the inherent random heterogeneity present in materials ranging from the very new (steel foam) to the very old (wrought iron). Through computational simulations, validated by experiments, I am characterizing the way in which material heterogeneity manifests as uncertainty in material response that then influences structural reliabilities.

Other interests: Historic civil engineering structures; biomechanics; sustainability and the built environment.

External Funding and Proposals

NRT: Enhancing Resiliency and Increasing Equity in the Transition to a Sustainable Energy Future ($2.75 million, Sr. Personnel with MA Lackner PI) NSF 2020-2025

Tilt-Up Tower and Installation System to Reduce the Cost of Distributed Wind Turbines ($500,000, co-PI with MA Lackner, S Gerasimidis, Pecos Wind Power, UMass portion $61,000) DoE 2020-2021

Techno-Economic mooring configuration and design for floating offshore wind turbines in shallow waters ($300,000, co-PI with K. Sharman, MA Lackner) NOWRDC 2020-2021

Innovative Anchoring System for Floating Offshore Wind ($800,000, co-PI with Triton Systems UMass portion $175,000) 2020-2021

Innovative Deep-Water Mooring Systems for Floating Wind Farms (DeepFarm) ($850,000 co-PI with partners Principle Power, NREL, Equinor, Aker Solutions, UMass portion $130,000) NOWRDC 2020-2023

Innovative Deep-Water Mooring Systems for Floating Wind Farms (DeepFarm) ($60,000 co-PI with MA Lackner, KT Sharman, DJ DeGroot) Mass CEC 2020-2023

Establishing The Low Carbon Energy Transition in a Changing Climate Network ($32,160, Sr. Personnel with PIs R DeConto, MA Lackner et al.) World Universities Network 2020-2021

Collaborative Research: GOALI: Novel and efficient seabed ring anchor for omnidirectional loading ($850,000, PI with DJ DeGroot, C Aubeny, M Landon, A Martinez, UMass portion $270,000) National Science Foundation 2020-2024

Planning Grant: Engineering Research Center for Offshore Wind Energy Center for Infrastructure Resilience, Control, Innovation, and Transmission (OWE-CIRCIT) ($100,000 PI with A Bates (UMass), D Kuchma, A Stankowic (Tufts), P Mandal (UTEP) Co-PIs, UMass portion $35,000) National Science Foundation 2018-2019

Geospatial statistical modeling for efficiency and economy in site investigations and foundation design ($200,000, co-lead PI with DJ DeGroot) Massachusetts Clean Energy Center 2017-2020

Development of a national offshore wind research agenda ($75,000 co-PI with J Manwell (PI), MA Lackner, ED Baker, J McGowan, DJ DeGroot (co-PIs)) Massachusetts Clean Energy Center 2016-2018

Breaking wave loads on offshore wind turbines ($144,343, co-PI with MA Lacker (PI), D Schmidt, AT Myers (Northeastern)) Bureau of Safety and Environmental Enforcement (BSEE) 2016-2017.

Novel mooring systems for offshore energy generation systems ($51,000, PI with DJ DeGroot, Co-PI) Massachusetts Clean Energy Center 2016-2018.

Collaborative Research: GOALI: Efficient multiline mooring systems for floating wind turbines ($497,341 PI with DJ DeGroot, C Aubeny (Texas A&M), ML Maynard (UMaine) UMass portion $251,834) NSF 2015-2018.

Massive Timber Panels from Low-value Northeastern Woods ($390,925,Co-PI with PL Clouston and A Schreyer) NSF 2015-2018.

Collaborative Research: Advancing the Dissemination of the Creative Art of Structural/Civil Engineering ($760,394 PI with M Garlock (Princeton), CD Moen (Virginia Tech) UMass/Arwade portion $127,167) NSF 2014 - 2018

Risk and decision-making for the hurricane threat to offshore wind farms ($125,802 PI with AT Myers, JF Hajjar (Northeastern) EM Hines (Tufts) UMass/Arwade portion $68,495) Massachusetts Clean Energy Center 2014 - 2016

Collaborative research: GOALI: Advancing system reliability with application to light framed structures ($399,000 PI with BW Schafer (Johns Hopkins) CD Moen (Virginia Tech) UMass/Arwade portion $155,000) NSF 2013 - 2017

Collaborative research: Reliability-based hurricane risk assessment for offshore wind farms. ($325,000. PI with AT Myers and JF Hajjar (Northeastern) UMass/Arwade portion $146,000) NSF, 2012 - 2016

Calibration of reliability index considering system effects. ($10,000, co-PI with BW Schafer (Johns Hopkins) and C Moen (Virginia Tech). UMass/Arwade portion $3,333) American Iron and Steel Institute, 2012.

IGERT: Offshore Wind Energy Engineering, Environmental Science, and Policy. (Approximately $2 million, one of approximately 20 senior personnel, ED Baker PI). NSF, 2011-2016.

Collaborative Research: Reconfiguring steel structures: energy dissipation and buckling mitigation through the use of steel foams. ($340,000, PI with BW Schafer (Johns Hopkins) and JF Hajjar (Northeastern). UMass/Arwade portion $158,025) NSF, 2010-2012.

Reconfiguring steel structures: energy dissipation and buckling mitigation through the use of steel foams: REU supplement. ($6,000) National Science Foundation, 2011.

Modeling the design limit states of structural composite lumber: REU supplements. ($12,000, co-PI with PL Clouston) National Science Foundation, 2009, 2010.

Modeling the design limit states of structural composite lumber. ($300,000, co-PI with PL Clouston) National Science Foundation, 2009-2011.

Adaptive use of historic truss bridges for civil engineering instruction. ($149,779, PI with AJ Lutenegger) National Science Foundation, 2008-2010.

A framework for microstructural design using Bayesian classifiers. ($287,000, PI with T Igusa) National Science Foundation, 2004-2007.

Internal Funding and Proposals

Field study of the Swiss legacy of structural art. ($2,500 PI) UMass International Programs Office, 2012.

FlexGrant for teaching/faculty development: Course development: *Perspectives on the evolution of structures.* ($500 each instance, PI) University of Massachusetts, Amherst, Office of Faculty Development / Center for Teaching, 2009-2010, 2013.

Preliminary experiments on the structural application of metal foams. ($30,000, PI) University of Massachusetts, Amherst, Faculty Research Grant, 2008-2009.

An engineer's guide to Baltimore. ($6,000, co-PI with R Sangree, graduate student) Johns Hopkins Center for Educational Resources, 2004-2005.

Interactive case studies: Evolution of structures. ($6,000, co-PI with R Sangree, graduate student) Johns Hopkins Center for Educational Resources, 2003-2004.

Research Student and Postdoc Advising (3 Postdoc, 6 PhD, 12 MS/MCE, 17 BS/BSE)

Graduate & Postdoctoral:
University of Massachusetts, Amherst:
Shengmin Luo (Postdoc 2020)
Krishnaveni Balakrishan (PhD in progress, co-advised with DJ DeGroot)
Ning Luo (Postdoc 2018-2019)
Spencer Hallowell (Postdoc 2016-2018)
Fiona O'Donnell (MS/PhD in progress)

Ignacio Cetrangolo (MS 2018)
Richard Racz (MS 2018)
Casey Fontana (PhD 2019, co-advised with DJ DeGroot)
Wystan Carswell (MS 2012, PhD 2015, co-advised with DJ DeGroot);
Yibing Xiang (Postdoc 2014-2015)
Kai Wei (Postdoc 2013-2015);
Hernan Pinto (Postdoc, 2009-2010);
Alireza Amini (PhD 2012);
Mohamad Krem (PhD 2012);
Brooks Smith (MS 2012);
Mohammadreza Moradi (PhD 2011);
Sean Kelton (MS 2009);
Patrick Veale (MS 2009);
Russell Winans (MS 2008);

Johns Hopkins University and other institutions:

Libin Tan (PhD 2008, Johns Hopkins);
Arghavan Louhghalam (MS 2007, Johns Hopkins);
Xiulin Sun (MCE 2005, Johns Hopkins);
Mitesh Popat (MS 2004, Johns Hopkins);

Undergraduate (17 total students): Emma and (BSE 2020); Anand Patel (BSE 2019); Andrew Rock (BSE 2016); Ignacio Cetrangolo (BSE 2015); John Jermyn (BSE 2014); Zhiren Zhu (BSE 2013); Marc Fernandez (BSE 2012); Saranthip Rattanaserikiat (BSE 2011); Brian Post (BSE 2011); Terence DaCosta (BSE 2011); Meghan Krupka (BSE 2010); Daniel Posfai (BSE 2010); John Sullivan (BSE 2011); Randy Machon (BSE 2010); Kelly Shanahan (BSE 2010) Allen Sit (BSE 2010); Russell Winans (BSE 2007); Ryan Mones (BSE 2009); Kara Peterman (BS 2009 Swarthmore College). Ying Guan (BSE 2008, Johns Hopkins); Christina Terpeluk (BSE 2006, Johns Hopkins); Liakos Ariston (BSE 2005, Johns Hopkins); Thomas Lydigsen (BSE 2005, Johns Hopkins); Allan Olson (BSE 2006, Johns Hopkins); Annette Tardiff (BSE 2004, Johns Hopkins); Russell Williams (Baltimore Polytechnic Institute, High School).

Graduate Committee Member (¿40 total students from 5 departments and 4 institutions)

University of Massachusetts, Amherst

Jennifer Beyer (PhD in progress, Geosciences); Jessica McBeck (PhD in progress, Geosciences); Gary Chang (PhD in progress, Mechanical Engineering); Maija Benitz (PhD in progress, Mechanical Engineering); Mark Reiland (PhD in progress, Environmental Conservation); Gordon Stewart (MS 2011, PhD 2015, Mechanical Engineering); Justin Herbert (PhD 2014, Geosci); Banafsheh Seyed-Aghazadeh (PhD 2014, Mech Eng); Brianna Tamboulian (PhD 2014, Mech Eng); Onur Yilmaz (MS 2014, Mech Eng); Sangrok Yeo (PhD 2016 expected); Selman Ozbayat (PhD 2013, Electrical Eng.); Tommy Sebastian (MS 2012 Mech. Eng.); Geoff McGuirk (MS 2012); Elizabeth Beauregard (MS expected, BCT); Emre Kalayci (MS 209, PhD, 2012); Charlie McLelland (MS 2012 expected, Mech. Eng.); Colin Roderick (MS 2012, Mech. Eng.); Xiao Ye (MS 2012, Mech Eng); Zhuo Yang (MS 2011 Building and Construction Tech.); Cihan Ciftci (PhD 2012); Dylan Chase (MS 2011, Mechanical Engineering); Sandeep Menon (PhD 2011, Mechanical Engineering); Stacy Canepari (MS 2009, Mechanical Engineering); Jon Lewis (MS 2009, Mechanical Engineering); Helena Charron (MS 2009); Quan Nguyen (MS 2009); Ryan Shackleton (PhD 2009, Geosciences); Shuangwen Shen (PhD 2008, Mechanical Engineering); Meltem Duran (MS 2009, PhD 2015, Mechanical Engineering); Carl Niemitz (MS 2007); Michael Mitchell (MS 2008); Andrew Jeffrey (MS 2007).

Johns Hopkins University and other institutions

Athina Spyridaki (PhD 2017 expected Columbia); Jenny Sideri (PhD 2017 expected Columbia); Aritra Chatterjee (PhD 2016 expected Virginia Tech); Spencer Hallowell (PhD 2016 expected Northeastern); Vahid Valamanesh (PhD 2015 Northeastern); Kirubel Teferra (PhD 2010 Columbia); Michael Shields (PhD 2010, Columbia); Mina Seif (PhD 2010, Johns Hopkins); Sun Koo Kim (MS 2005, Johns Hopkins); Haoyang Liu (PhD 2004, Johns Hopkins); Zailong Wan (PhD 2004, Johns Hopkins); Dubar Kamara (MS 2002, Johns Hopkins).

Teaching

University of Massachusetts, Amherst

Probabilistic Methods in Structural Mechanics (CEE 615): Structural reliability, random processes and fields, heterogeneous materials, random vibrations.

Structural Analysis (CEE331): Force and deformation analysis of statically determinate and indeterminate frames and trusses.

Advanced Solid Mechanics (CEE630): Theory of elasticity, energy methods, elementary plasticity and fracture mechanics.

Finite Element Analysis (CEE605): Finite element analysis for solid mechanics problems.

Introduction to Civil Engineering (ENGIN 111): Two week module introducing basic concepts of structural engineering.

Perspectives on the Evolution of Structures (CEE211): Great works of structural design for a broad university audience including CEE majors and non-majors. New course adapted for instruction at UMass during Lilly Teaching Fellowship 2008-2009.

Johns Hopkins University

Advanced Structural Analysis (CE445): Matrix methods for linear and nonlinear analysis of trusses and frames.

Structural Mechanics (CE729): Theory of elasticity, energy methods, numerical methods.

Perspectives on the Evolution of Structures (CE141): Great works of structural design for a broad university audience including CE majors and non-majors.

Stochastic Micromechanics (CE728): Elements of probability theory, effective material properties, homogenization, material microstructure modeling.

Structural Reliability (CE786): Elements of probability theory, FORM, SORM, load modeling, component and system reliability.

Summary table of UMass teaching experience

(Ratings on a five point scale)

Year	Term	Course	Enrollment	Course rating	Instructor rating
2020	Spring	Persp. Evol. Structures (CEE 211)	12	4.6	4.9
2019	Fall	Comp. meth. for CEE (CEE 244)	93	4.2	4.6
	Spring	Finite element analysis (CEE/MIE 605)	25	4.0	4.7
	Spring	Prob. Meth. Struct. Mech. (CEE 615)	6	4.4	4.9
2018	Fall	Comp. meth. for CEE (CEE 244)	88	4.1	4.5
	Spring	Persp. Evol. Structures (CEE 211)	17	4.8	4.5
2017	Fall	Adv. Solid Mechanics (CEE/MIE 630)	13	4.7	4.5
	Fall	Comp. meth. for CEE (CEE 244)	81	4.6	4.2
	Spring	Prob. Meth. Struct. Mech. (CEE 615)	8	5.0	5.0
2016	Fall	Comp. meth. for CEE (CEE 244)	18	4.7	4.9
	Fall	Adv. Solid Mechanics (CEE/MIE 630)	18	4.3	4.5
	Spring	Finite element analysis (CEE/MIE 605)	33	3.9	4.3
	Spring	Persp. Evol. Structures (CEE 211)	32	4.3	4.5
2015	Fall	Adv. Solid Mechanics (CEE/MIE 630)	35	4.5	4.6
	Spring	Finite element analysis (CEE/MIE 605)	35	4.0	4.4
2014	Fall	Prob. Meth. Struct. Mech. (CEE 615)	7	3.8	4.3
	Fall	Adv. Solid Mechancis (CEE/MIE 630)	29	4.2	4.5
	Spring	Finite element analysis (CEE/MIE 605)	32	4.1	4.4
	Spring	Persp. Evol. Structures (CEE 211)	30	3.9	4.3
2013	Fall	Adv. Solid Mechanics (CEE/MIE 630)	21	4.3	4.7
2012	Fall	Adv. Solid Mechanics (CEE/MIE 630)	25	4.2	4.1
	Spring	Persp. Evol. Structures (CEE 211)	38	4.5	4.7
	Spring	Prob. Meth. Struct. Mech. (CEE 615)	4	4.3	4.8
2011	Spring	Finite Element Analysis (CEE/MIE 605)	24	3.0	3.4
	Spring	Prob. Meth. Struct. Mech. (CEE 615)	7	3.9	4.1
2010	Fall	Structural Analysis (CEE 331)	80	4.2	3.8
	Spring	Structural Analysis (CEE 331)	20	4.2	4.7
	Spring	Persp. Evol. Structures (CEE 211)	44	4.6	4.8
2009	Fall	Adv. Solid Mechanics (CEE 630)	13	4.2	4.8
	Spring	Persp. Evol. of Structures (CEE 211)	42	4.3	4.4
2008	Fall	Structural Analysis (CEE 331)	60	4.1	4.6
	Spring	Structural Analysis (CEE 331)	18	2.8	3.1
2007	Fall	Adv. Solid Mechanics (CEE 630)	13	4.1	4.5
	Spring	Finite Elem. Analysis (CEE/MIE 605)	10	4.4	4.9
2006	Fall	Adv. Solid Mechanics (CEE 630)	4	4.5	4.5

Guest lectures and other teaching activity

The City, A Multidisciplinary Perspective (Johns Hopkins); Introduction to Art History (Fordham); Structural Analysis (Cornell); Structural Reliability (Cornell); Lecture Day Colloquium (Western New England College); Guest critic at various architecture studios at UMass and the Maryland College Institute of Art; Research practicum advisor, Baltimore Polytechnic Institute.

Service

Professional Service

Committee membership

ASCE Dynamics (2002-2006);
ASCE Probabilistic Methods Committee (2003-present, control member 2010 - 2012, vice-chair 2012-2013, chair 2013-);
Founding chairman of student awards subcommittee of ASCE PMC (2008-2014);
International Association for Structural Safety and Reliability, Comp. Mechanics (2003-present);
International Association for Structural Safety and Reliability, Material Modeling (2003-present).
International Network for Structural Art, Teaching Materials Group Leader (2011- present)

Conference organizing/scientific committee

French American Innovation Day on Offshore Wind 2019
NAWEA/WindTech conference 2019
Disseminating the creative art of structural/civil engineering, and NSF-funded workshop, 2015, 2016;
7th International Conference on Computational Stochastic Mechanics, 2014;
13th International Probabilistic Workshop, 2015;
Engineering Mechanics Institute Conference (2011, 2012, 2013, 2014, 2016);
International Conference on Structural Safety and Reliability 2013.

Conference session organization

US National Congress on Computational Mechanics (2009);
International Conference on Structural Safety and Reliability (2005, 2009, 2013);
ASCE Engineering Mechanics Conference (2007, 2008, 2009, 2014, 2016);
ASCE Probabilistic Methods Conference (2004, 2016).

Reviewer / Editor

Associate Editor: ASCE Journal of Engineering Mechanics (2014-present)
Reviewer: American Association for the Advancement of Science; International Journal of Architectural Heritage; Springer Verlag; Wind Engineering and Industrial Aerodynamics; Bioresources; Construction & Building Materials ; Journal of Materials in Civil Engineering ; Computer Physics Communications ; Thin Walled Structures ; ASCE Press; Metals; Int. Journal for Uncertainty Quantification; Journal of Engineering Mechanics; Metallurgical Transations; NASA; NSF CMMI; Probabilistic Engineering Mechanics; Romanian Science Foundation; Computer Methods in Applied Mechanics and Engineering; International Network for Structural Art; Scientia Iranica; Structural Safety;

University Service

University of Massachusetts, Amherst

CEE Department Personnel Committee (2012-present);
Graduate Program Director Civil & Environmental Engineering (2012 - present);
Search Committee Chair, Structural Engineering and Mechanics (2014-2015);
Search Committee, International Programs Office (2014);
Search Committee, Civil & Environmental Engineering (2011-2012);
Search committee, joint appointment in Architecture and Design, Landscape Architecture (2011-2012);
Search committee, extension professor in the program Building and Construction Technology (2010);

Search committee, proposal development specialist, University Research Development (2010);
Organizer of the Civil Engineering History and Heritage Lecture (2008-2014);
Department Curriculum Committee (2009-2012);
Departmental liaison to Architecture and Design Program (2008-present);
Departmental BS/MS committee (2008-2010);
Structural Engineering and Mechanics group seminar coordinator (2007-2010);
Structural Engineering and Mechanics faculty search committee (2007-2008);
Deptartment scholarship committee (2006-2007, 2010);
Undergraduate advising (2006-present);
Faculty meeting secretary (2007-2008);
Deptartment capstone design committee (2007-2008).

Johns Hopkins University

University ethics board juror (2005);
Deptartment undergraduate curriculum committee (2002-2006);
Deptartment seminar series coordinator (2003-2004);
ASCE student chapter advisor (2004-2006);
ASCE steel bridge team faculty advisor (2005);
Undergraduate advising (2003-2006);
Whiting School of Engineering external relations committee (2005-2006).

Consulting, Professional Practice and other Professional Activity

Cold Formed Steel Research Consortium — 2013
Affiliated researcher

Flodesign Inc. — 2008
Wind turbine load analysis

Daedalus Cycles — 2007
Mechanical testing of bamboo bicycle tube connection details

STX Lacrosse — 2006-2008
Strength analysis and testing of lacrosse sticks

Engineering Society of Baltimore — 2004
Strength evaluation of structural roofing material from 19th century building

Intern Engineer — Summer 1996
Robert Silman Associates, New York City

Outreach activities

Ingenuity Project at Baltimore Polytechnic Institute, guest lectures on structural engineering and student advising (2002-2005).

Women in Science and Engineering, Johns Hopkins University, presentations on structural engineering (2005).

Guest assistant curator, The George Peabody Library. Bridge Engineering in the Collection of the Peabody Library (2006).

Publications

*indicates student or postdoc co-author

Journal Articles

Published or in press:

77. Kane B, Brigham E, Arwade SR "The effects of technique and leaves on loading during climber ascents" *Urban Forestry and Urban Greening* (in press)

76. Bahmanzad A, Clouston PL, Schreyer A, Arwade SR "Shear properties of symmetric angle-ply cross-laminated timber (CLT) panels" *Journal of Materials in Civil Engineering* (in review)

75. Qiao C, Myers AT, Arwade SR "Characteristics of hurricane-induced wind, wave, and storm surge maxima along the U.S. Atlantic coast" *Renewable Energy* (in press)

74. Bahmanzad A, Clouston PL, Arwade SR, Schreyer AC "Planar shear properties of Eastern Hemlock for Different Fiber Orientations" *Journal of Materials in Civil Engineering* (accepted)

73. Kapoor A, Ouakka S, Arwade SR, Lundquist JK, Lackner MA, Myers AT, Worsnop RP, Bryan GH"Hurricane eyewall winds and structural response of wind turbines" *Wind Energy Science* (accepted)

72. Kane B, Arwade SR "Quantifying tension and deflection in pre-tensioned speedlines carrying a load" *Urban Forestry and Urban Greening* (in press)

71. Qiao C, Myers AT, Arwade SR "Validation and Uncertainty Quantification of Metocean Models for Assessing Risk" *Wind Energy* (in press)

70. Fontana CM, Hallowell S, Myers AT, Arwade SR, Landon M, DeGroot DJ, Aubeny C "Spatial Coherence of Ocean Waves in Multiline Anchor Systems for Floating Offshore Wind Turbines" *Ocean Engineering* 184:59-73 (2019)

69. Gusella F, Orlando M, Arwade SR, Peterman KD "Influence of mechanical and geometric uncertainty on rack connection structural response" *Journal of Constructional Steel Research* 153:343-355 (2019)

68. Khoshbakt N, Couston PL, Arwade SR, Schreyer A "Evaluation of ASTM D5764 dowel connection tests for laminated veneer bamboo (LVB)" *Journal of Testing and Evaluation* 47(4) (2019)

67. Song J, Sun Q, Luo S Arwade SR, Gerasimidis G, Guo Y, Zhang G "Compression behavior of individual thin-walled metallic hollow spheres with patterned distributions of microporosity" *Materials Science and Engineering A* 734:453-475 (2018)

66. Fontana CM, Arwade SR, DeGroot DJ, Hallowell ST, Landon ME, Aubeny CP, Diaz BS, Myers AT, Hajjar JF, Ozmutlu S "Multiline anchor force dynamics in offshore wind farms with OC4 floating system" *Wind Energy* 21(11) (2018)

65. Hallowell ST, Arwade SR, Fontana CM, DeGroot DJ, Aubeny CP, Diaz BS, Myers AT, Landon ME "System Reliability of Floating Offshore Wind Farms with Multiline Anchors" *Ocean Engineering* 160:94-104 (2018)

64. Hallowell S, Myers AT, Arwade SR, Pang W, Rawal P, Hines EM, Hajjar JF, Qiao C, Valamanesh V, Wei K, Carswell W, Fontana CM "Hurricane Risk Assessment of Offshore Wind Turbines" *Renewable Energy* 125:234-249 (2018)

63. Willis DJ , C Niezrecki, D Kuchma, EM Hines, SR Arwade, RJ Barthelmie, M DiPaola, PJ Drane, CJ Hansen, M Inalpolat, JH Mack, AT Myers, M Rotea "Wind Energy Research: State-of-the-Art and Future Research Directions" *Renewable Energy* 125:133-154 (2018)

62. Cetrangolo I, Arwade SR, Kane B "An investigation of branch stresses induced by arboricultural operations" *Urban Forestry and Urban Greening* 30:124-131 (2018)

61. Smith BH, Chatterjee A, Arwade SR, Moen CD, Schafer BW "System Reliability Benefits of Repetitive Framing in Cold-Formed Steel Floor Systems" *Journal of Structural Engineering* 144:(6):04018061 (2018)

60. Khoshbakht N, Clouston PL, Arwade SR "Computational modeling of laminated veneer bamboo (LVB) dowel connections" *Journal of Materials in Civil Engineering* 30:https://doi.org/10.1061/(ASCE)MT.1943-5533.0002135 (2017)

59. Chatterjee A, Arwade SR, Schafer BW, Moen CD "System Reliability of Floor Diaphragms Framed from Cold-Formed Steel with Wood Sheathing" *Journal of Structural Engineering* 144:https://doi.org/10.1061/(ASCE)ST.1943-541X.0001958 (2017)

58. Alvarez J, Brea SF, Arwade SR "Nonlinear Backbone Modeling of Concrete Columns Retrofitted with Fiber-Reinforced Polymer or Steel Jackets" *ACI Structural Journal* 115:53-64 (2018)

57. Bian G, Chatterjee A, Buonopane SG, Arwade SR, Moen CD, Schafer BW "Reliability of cold-formed steel framed shear walls as impacted by variability in fastener response" *Engineering Structures* 142:84-97 https://doi.org/10.1016/j.engstruct.2017.03.072 (2017)

56. Wei K, Myers AT, Arwade SR "Dynamic Effects in the Response of Offshore Wind Turbines Supported by Jackets under Wave Loading" *Engineering Structures* 142:36-45 https://doi.org/10.1016/j.engstruct.2017.03.074 (2017)

55. Amini A, Arwade SR, Clouston PL "Modeling the effect of void shapes on the compressive behavior of parallel strand lumber" *Journal of Materials in Civil Engineering* https://doi.org/10.1061/(ASCE)MT.1943-5533.0001980 (2017)

54. Song J, Sun Q, Yang Z, Luo S, Xiao X, Arwade SR, Zhang G "Effects of microporosity on elasticity and yielding of the thin wall of metallic hollow spheres" *Materials Science and Engineering A* DOI: 10.1016/j.msea.2017.01.105 (2017)

53. Smith* BH, **Arwade SR**, Schafer BW, Moen CD "Design component and system reliability in a low-rise cold formed steel framed commercial building" *Engineering Structures* DOI:10.1016/j.engstruct.2016.08.049 (2016)

52. Wei* K, **Arwade SR**, Myers AT, Hallowell S, Hajjar JF, Hines EM "Toward Performance-based Evaluation for Offshore Wind Turbine Jacket Support Structures" *Renewable Energy* 97:709-721 (2016)

51. Wei* K, **Arwade SR**, Myers AT, Valamanesh* V, Pang W "Effect of wind and wave directionality on the structural performance of offshore wind turbines supported by jackets during hurricanes" *Wind Energy* DOI: 10.1002/we.2006 (2016)

50. Carswell* W, **Arwade SR**, DeGroot DJ, Myers AT "Natural Frequency Degradation and Permanent Accumulated Rotation for Offshore Wind Turbine Monopiles in Clay" *Renewable Energy* 97:319-330 (2016)

49. Valamanesh* V, Myers AT, **Arwade SR**, Hajjar JF, Hines EM, Pang W "Wind-wave Prediction Equations for Probabilistic Offshore Hurricane Hazard Analysis" *Natural Hazards* DOI: 10.1007/s11069-016-2331-z (2016)

48. Stewart* GM, Lackner MA, **Arwade SR**, Hallowell* S, Myers AT "Statistical Estimation of Extreme Loads for the Design of Offshore Wind Turbines" *Wind Engineering* 39:629-650 (2015)

47. Fontana* CM, Carswell* W, **Arwade SR**, DeGroot DJ, Myers AT "Sensitivity of the dynamic response of monopile-supported offshore wind turbines to structural and foundation damping" *Wind Engineering* 39:609-627 (2015)

46. **Arwade SR**, Deodatis G, Teferra K "Variability response functions for apparent material properties" *Probabilistic Engineering Mechanics* 44:28-34 (2016)

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2. Hallowell ST, Arwade SR, Qiao C, Myers AT, Pang W "Breaking Wave Hazard Estimation Model for the U.S. Atlantic Coast" *ASCE/ASME Journal of Risk and Reliability* (in review)

3. Hallowell ST, Arwade SR, Diaz BD, Aueny CP, Fontana CM, DeGroot DJ, Landon ME "Increasing Robustness of Multiline Anchor Systems for Floating Offshore Wind Turbines" *ASCE/ASME Journal of Riskand Reliability* (in review)

4. Batalha N, Arwade SR, Vieira LCM, Szyniszewski S "Identification of spatially varying elastic material parameters from full-field strain measurement and global loading" *Proceedings of the Royal Society Part A* (in review)

5. Fontana CM, Arwade SR, DeGroot DJ, Hallowell ST, Landon M, Aubeny C, Diaz B, Ozmutlu S "Application of the Multiline Anchor Concept in an Existing Floating Offshore Wind Farm" *Soils and Foundations* (in review)

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2. Clouston PL, Arwade SR, Amini* A "Characterization and strength modeling of laminated bio-based composites" *Bio-Based Composites for High-Performance Materials: From Strategy to Industrial Application* eds. Chollakup R, Smitthipong W, Nardin M, CRC Press (forthcoming)

1. Arwade, SR "Random microstructural models with application to small scale fracture." In Random Material Microstructures: Modelling and Material Behavior. K. Sobczyk and J. Trebicki eds. Institute of Fundamental Technological Research, Polish Academy of Sciences (2004).

Non-reviewed Journal Publications

1. Graham-Brady, L. L. Arwade, SR, Corr, D. J., Gutierrez, M. A., Breysse, D., Grigoriu, M., & Zabaras, N. "Probability and materials, from nano- to macro-scale: a summary." *Probabilistic Engineering Mechanics*. 21(3):193-199 (2006).

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56. Batalha N, Vieira L, Arwade SR, Szyniszewski S. Identification of stochastic field of elastic constants from strain measurements 41 St Solid Mechanics Conference, Warsaw, Poland, 2018

55. Hallowell ST, Arwade SR, Johlas H, Lomonaca P "Quantification of Predicted Wave Forces From Distant Elevation Measurements" OMAE 2019, Glasgow 2019

54. Fontana CM, Arwade SR, DeGroot DJ, Hallowell ST, Landon M, Aubeny C, Diaz B, Myers AT, Ozmutlu S "The Effect of Mooring Spatial Geometry and Wind Wakes on Multiline Anchor Force Dynamics in Floating Offshore Wind Farms" OMAE 2019, Glasgow, 2019

53. Hunsberger E, Hallowell ST, Fontana CM, Arwade SR "The Effect of Yaw Error On the Mooring systems of Floating Offshore Wind Turbines in Extreme Weather Conditions" Proceedings of the 2018 OMAE conference, Madrid, Spain (2018)

52. Fontana CM, Arwade SR, Hallowell ST, DeGroot DJ, Myers AT, Landon ME, Aubeny CP, Ozmutlu S "Spatial Wave Correlation in Multiline Anchor Systems for Floating Offshore Wind Turbines" ICOSSAR 2017, Vienna (2017)

51. Fontana CM, Arwade SR, DeGroot DJ, Hallowell ST, Aubeny CP, Landon ME, Myers AT "Multiline Anchors for the OC4 Semisubmersible Floating System " ISOPE 2017, San Francisco, (2017)

50. Hallowell ST, Arwade SR, Fontana CM, DeGroot DJ, Diaz BD, Aubeny CP, Landon ME "Reliability of Mooring Lines and Shared Anchors of Floating Offshore Wind Turbines" ISOPE 2017, San Francisco (2017)

49. Diaz BD, Rasulo M, Aubeny CP, Fontana CM, Arwade SR, DeGroot DJ, Landon M "Multiline Anchors for Floating Offshore Wind Towers" Proceedings of OCEANS 16, Monterey, CA (2016)

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45. Wei K, Arwade SR, Myers AT, Hallowell S, Hajjar JF, Hines, EM "Performance Levels and Fragility for Offshore Wind Turbine Support Structures during Extreme Events" Structures Congress 2015, Portland, OR, (2015)

44. Valamanesh V, Myers AT, Arwade SR, Hajjar JF "The Impact of Peak Spectral Period in the Design of Offshore Wind Turbines for the Extreme Sea State" Structures Congress 2014, Boston, (2014)

43. Carswell W, Johansson J, Lohvolt F, Arwade SR, DeGroot DJ "Dynamic mudline damping for offshore wind turbine monopiles" Proceedings of the ASME 2014 33rd International Conference on Ocean, Offshore and Arctic Engineering OMAE2014 June 8-13, 2014, San Francisco, California, USA (2014)

42. Chatterjee A, Moen CD, Arwade SR, Schafer BW "System reliability sensitivity to fastener capacity in cold-formed steel wood-sheathed floor diaphragms" Eurosteel 2014, Naples, Italy, (2014)

41. Myers AT, Arwade SR, Manwell JF "Consideration of hurricanes and tropical cyclones in the design of offshore wind turbines." European Wind Energy Academy Conference, Barcelona, (2013)

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32. Krem* M, Hoque ST, *Arwade SR* "Effect of built form configuration on energy and structural performance of skyscraper buildings" Building Enclosure Science and Technology Conference Atlanta, (2012)

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27. Arwade SR, Hajjar, JF, Schafer BW, Moradi M, "Steel foam material processing, properties, and potential structural applications." NSF CMMI Grantees Conference, Atlanta (2011)

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21. Ferrante FJ, Brady LLG, Acton* K, Arwade SR "An overview of micromechanics-based techniques for the analysis of microstructural randomness in functionally graded materials" In Proceedings of the 9th International Conference on Multiscale and Functionally Graded Materials. Paulino, G.H., et al. eds., AIP Proceedings Series, Pp. 190-195, Oahu, HI, (2006)

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13. Arwade SR, Schafer BW "'Perspectives on the Evolution of Structures': Teaching civil engineering history at Johns Hopkins" In Proceedings of the ASCE History and Heritage Committee at the ASCE National Conference and Exposition pp. 332-342. Baltimore, MD (2004)

12. Ariston* L, Lydigsen* T, Arwade SR "Structural behavior of the Bollman truss bridge at Savage, Maryland." In Proceedings of the ASCE History and Heritage Committee at the ASCE National Conference and Exposition. pp. 312-331. Baltimore, MD (2004)

11. Arwade SR "Turning 'Structures and the Urban Environment' into 'Perspectives on the Evolution of Structures. In Proceedings of Teaching and Scholarship in the Grand Tradition of Modern Engineering. A symposium held at Princeton University, August 9-23. Published by the Department of Civil and Environmental Engineering, Princeton University (2004)

10. Arwade SR "Translation vectors with non-identically distributed components." In Proceedings of the 9th ASCE Conference on Probabilistic Methods. Albuquerque, NM (2004)

9. Schafer BW, Arwade SR "Mechanical properties of random networks." In Proceedings of the 17th ASCE Conference on Engineering Mechanics. Newark, DE (2004)

8. Arwade SR, Grigoriu M "A model for non-stationary and anisotropic polycrystalline microstructures." In Proceedings of the 9th International Conference on Applications of Statistics and Probability in Civil Engineering. Millpress. San Francisco, CA (2003)

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6. Liu* H, Arwade SR, Igusa T "Random composites classification and damage estimation using a classifier model." In Proceedings of the 16th ASCE Engineering Mechanics Conference. Seattle (2003)

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3. Iesulauro E, Ingraffea AR, Arwade SR, Wawrzynek PA "Simulation of grain boundary decohesion and crack initiation in aluminum microstructure models." In Proceedings of 33rd National Symposium on Fatigue and Fracture Mechanics, Moran, WY (2001)

2. Arwade SR, Grigoriu M "The material state simulator: A prototype." 41st AIAA/ASME/ASCE/ AHS/ASC Structures, Structural Dynamics and Materials Conference. Atlanta, GA (1999)

1. Arwade SR, Grigoriu M, Ingraffea AR "Crack growth in stochastic microstructures." In Stochastic Structural Dynamics, Proceedings of the 4th International Conference on Stochastic Structural Dynamics. Ed: Spencer, B. F. & Johnson, E. A. Notre Dame, IN (1998)

Invited Lectures and departmental seminars

35. Arwade SR "The creative art of structural engineering' RPI February 2020

34. Arwade SR "Extreme events on offshore wind energy infrastructure" Clarkson University April 2018

33. Arwade SR "Extreme events on offshore wind energy infrastructure" Texas Tech University April 2017

32. Arwade SR "Extreme events on offshore wind energy infrastructure" University at Buffalo (SUNY) April 2017

31. Arwade SR "The creative art of structural engineering" Yale University School of Architecture November 2016

30. Arwade SR "The creative art of structural engineering" Yale University School of Architecture November 2015

29. Arwade SR "The Creative Art of Structural Engineering" Springfield Technical Community College, October 2015

28. Arwade SR "Risk, reliability and offshore wind turbine support structures" Virginia Tech, March 2015

27. Arwade SR "Risk, reliability and offshore wind turbine support structures" Worcester Polytechnic Institute, 2014

26. Arwade SR "Mechanics and applications of steel foams" School of Construction Engineering, Pontifical Catholic University of Valparaiso, Chile, March 2014

25. Arwade SR "Green Buildings from Fathy to Yeang" Academic year inaugural lecture. School of Construction Engineering, Pontifical Catholic University of Valparaiso, Chile. March 2014.

24. Arwade SR “Stochastic homogenization of elastic material properties by the variability response method” University of Surrey (UK) 2013

23. Arwade SR “Stochastic homogenization of elastic material properties by the variability response method” University of Florence (UK) 2013

22. Arwade SR “Steel foam: characteristics and structural applications” Civil Engineering Department seminar, Ècole Polytechnique Fèdèrale de Lausanne. 2012

21. Arwade, SR “Pattern recognition techniques in solid mechanics.” Civil Engineering Department seminar, University of Massachusetts, Dartmouth, September 2010.

20. Arwade, SR “Pattern recognition techniques and the mechanics of heterogeneous media.” Civil Engineering Departmental Seminar, University of Perugia, Italy, June 2010.

19. Arwade, SR “Pattern recognition and statistical learning in stochastic mechanics.” Stochastic Methods in Mechanics: Status and Challenges. Warsaw, Poland, September 2009.

18. Arwade, SR “Using pattern recognition to solve solid mechanics problems.” Joint Civil and Mechanical Engineering seminar at the University of Maine, Orono, Maine, September 2008.

17. Arwade, SR “Solving solid mechanics problems without solving solid mechanics problems.” Smith College Science and Engineering Seminar Series, October 2006.

16. Arwade, SR “The structural art of Fazlur Khan and Robert Maillart and the place of structure in Baltimore.” Structural Engineers Institute of Maryland seminar series. March, 2006.

15. Arwade, SR “Approximate methods for solution of micromechanics problems involving uncertainty.” Department of Civil and Environmental Engineering, Northeastern University. March 2006.

14. Arwade, SR “Material evolution and damage at the microscale.” Department of Civil, Environmental, and Architectural Engineering, University of Colorado Boulder. March, 2005

13. Arwade, SR “The development of the infrastructure of New York City.” Department of Environmental Design, Maryland Institute, College of Art. October, 2005.

12. Arwade, SR “Rapid prediction of damage patterns in microstructured materials” Department of Civil and Environmental Engineering, University of Delaware. April, 2005

11. Arwade, SR “Characterization of random composites using a classifier model.” NSF workshop: Probability and materials, from nano- to macro-scale. Baltimore, MD, January 2005.

10. Arwade, SR “New structural forms in new materials.” Department of Environmental Design, Maryland Institute, College of Art. October, 2004.

9. Arwade, SR “Teaching Structures and the Urban Environment at Johns Hopkins University.” Teaching and Scholarship in the Grand Tradition of Modern Engineering. A symposium held at Princeton University, August 9-23, 2004.

8. Arwade, SR “The use of the George Peabody Library in structural engineering research.” The George Peabody Library of the Johns Hopkins University. October, 2004.

7. Arwade, SR “A framework for microstructural material modeling.” Department of Theoretical and Applied Mechanics Seminar. University of Nebraska. March 2004.

6. Arwade, SR “Random microstructural models with application to small scale fracture. Four lectures given at Random Material Microstructures: Modelling and Mechanical Behavior an advanced course sponsored by the Institute of Fundamental Technological Research of the Polish Academy of Sciences. Warsaw, Poland February 2-4 2004.

5. Arwade, SR, & Schafer, B. W. "'Perspectives on the Evolution of Structures': Teaching civil engineering history at Johns Hopkins" In Proceedings of the ASCE History and Heritage Committee at the ASCE National Conference and Exposition pp. 332-342 . Baltimore, MD, October 20-23, 2004.

4. Arwade, SR "Probabilistic research in Materials." Civil Engineering Department Seminar. Howard University. March 2004.

3. Arwade, SR "Simulation of Random Microstructures and Their Fracture." Department seminar. Department of Civil and Environmental Engineering, Cornell University, Ithaca, NY. April 24, 2003.

2. Arwade, SR "Stochastic characterization and simulation of material microstructures: Aluminum." Invited talk at Sandia National Laboratories, Albuquerque, New Mexico. March 27, 2002

1. Arwade, SR "Modeling and Simulation of Polycrystalline Microstructures." Invited talk at Sandia National Laboratories, Albuquerque, New Mexico. November 7, 2002

Presentations, posters, and abstracts at national and international conferences

70. Hallowell ST, Arwade SR, Myers AT "Uncertainties in the Reconstruction of Irregular Wave Surfaces" ASCE Engineering Mechanics Conference, Cambridge, Mass. (2018)

69. Hallowell ST, Arwade SR, Diaz BM, Aueny CP, DeGroot DJ "Optimizing Robustness in Multiline Anchorage Systems for Floating Offshore Wind Turbines" ASCE Engineering Mechanics Conference, Cambridge, Mass. (2018)

68. Luo N, Arwade SR, DeGroot DJ "Geospatial statistical modeling in offshore geotechnical site investigation" ASCE Engineering Mechanics Conference, Cambridge, Mass. (2018)

67. Fontana CM, Hallowell ST, Arwade SR "Spatial Wave Coherence in Multiline Anchor Systems for Floating Offshore Wind Turbines" ASCE Engineering Mechanics Conference, Cambridge, Mass. (2018)

66. H Kaboli, F ODonnell, PL Clouston, SR Arwade "Defects, material properties and mechanics of cross-laminated timber with eastern hemlock as a constituent" EMI 2017, San Diego (2017)

65. J Song, G Zhang, N Rahbar, SR Arwade, S Gerasimidis "Experimental and computational microscale characterization of hollow sphere mechanics" EMI 2017, San Diego (2017)

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