

JENNIFER M. RINKER, PH.D.

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EDUCATION

Ph.D.	Mechanical Engineering & Materials Science Duke University, Durham, North Carolina, USA	May 2016
M.S.	Civil & Environmental Engineering Duke University, Durham, North Carolina, USA	May 2014
B.S.	Engineering Harvey Mudd College, Claremont, California, USA	May 2011

AWARDS AND HONORS

Fellowships	<i>Graduate Student Research Program</i>	2015 – 2016
Grants	US Department of Energy Office of Science	
Scholarships	<i>Graduate Conference Travel Grant</i> Duke University Graduate School	2015
	<i>Graduate Energy Fellow</i> Duke University Energy Initiative	2013
	<i>NSF Graduate Research Fellow</i> US National Science Foundation	2011 – 2016
	<i>James B. Duke Fellow</i> Duke University Society of Duke Fellows	2011 – 2016
	<i>National Merit Scholar</i> US National Merit Foundation	2007 – 2011
	<i>Harvey S. Mudd Merit Awardee</i> Harvey Mudd College	2007 – 2011
Awards	<i>Marie Skłodowska-Curie Actions Seal of Excellence</i> European Commission	2017
	<i>Outstanding Dissertation Award</i> Duke University Mechanical Engineering & Materials Science	2016
	<i>“Electricity Generation and Storage” Poster Category Winner</i> CU Energy Frontiers Conference	2015
Honors	<i>Tau Beta Pi</i>	2007 – Present
	<i>High Distinction, Departmental Honors</i> Harvey Mudd College	2011
	<i>Dean’s List Distinction</i> Harvey Mudd College	2008 – 2009

RESEARCH EXPERIENCE

Current	<i>Postdoctoral Researcher</i> DTU Wind Energy	Aug 2016 – Present
	Working in the Loads and Controls section under the supervision of Kenneth Thomsen. Analysing atmospheric data for a Joint Industry Project with DNV GL. Contributing to code repositories for common pre/post-processing utilities. Meeting with researchers with related interests to exchange research concepts and techniques. Tuned a model of a Vestas V52 blade in HAWC2 to match static testing and modal analysis data. Presented dissertation research at section meeting.	
Graduate Research	<i>Office of Science Graduate Research Awardee</i> National Renewable Energy Laboratory (NREL) Golden, Colorado, USA	Jan 2015 – Jan 2016
	Relocated to Colorado for 12 months to conduct dissertation research at NREL under the supervision of Dr. Andrew Clifton. Delivered multiple presentations at NREL and at University of Colorado, Boulder, on research topics and on professional development. Served on internal review panels for NREL proposals. Ran simulations on NREL's high-performance computing cluster. Wrote and submitted a publication that was accepted by <i>Boundary-Layer Meteorology</i> .	
	<i>Doctoral Student</i> Mechanical Engineering and Materials Science Duke University, Durham, North Carolina, USA	May 2014 – May 2016
	<i>Dissertation title:</i> An Empirically Based Stochastic Turbulence Simulator with Temporal Coherence for Wind Energy Applications	
	Implemented temporal coherence (interfrequency Fourier phase correlation) in full-field stochastic turbulence simulator TurbSim and quantified its effect on lifetime wind turbine loads under the supervision of Dr. Henri Gavin. Developed FAST input files for WindPACT wind turbine models and quantified the effects of different wind parameters. Calibrated novel atmospheric models with temporal coherence from multiple wind datasets. Fit polynomial metamodels to WindPACT models and used them to simulate lifetime loads with and without temporal coherence. Performed system identification on NREL's 5 MW reference wind turbine to develop an optimal controller in FAST. Delivered lectures, hosted office hours, and graded for two courses. Participated in the Duke Graduate School Teaching Certificate by attending lectures and taking a course on college teaching.	
	<i>Master's Student</i> Civil & Environmental Engineering Duke University, Durham, North Carolina, USA	Aug 2011 – May 2014
	<i>Thesis title:</i> Phase Coherence in Wind Data and Simulation	
	Developed methodology to analyze and simulate nonstationary turbulence in 1D simulations using temporal coherence under the supervision of Dr. Henri P. Gavin. Analyzed temporal coherence characteristics in a sonic anemometer dataset via an empirical joint probability distribution between different wind parameters. Quantified increase in response of simple oscillator when subjected to excitation with temporal coherence. Optimized a switching TMD system to minimize vibration in a primary system. Developed a method to approximate stiffness-proportional damping with a viscoelastic model in explicit finite element analyses.	

Graduate Participant Jul 2012 –
Asia-Pacific Summer School in Smart Structures Aug 2012
Bangalore, India

Graduate students from five countries (India, South Korea, Japan, China, and USA) converged on the Indian Institute of Science in Bangalore, India for a three-week program in smart structures. Attended lectures on state-of-the-art techniques in smart structures, conducted laboratory experiments with team members, and attended the 7th International ANCRISST 2012 Workshop.

Graduate Student Researcher Jun 2011 –
Los Alamos Dynamics Summer School Aug 2011
Los Alamos National Laboratory

Worked in a three-person team to investigate realistic implementation of material damping in Abaqus/Explicit. Wrote and presented a conference paper that was accepted to and presented at the 2012 International Modal Analysis Conference. Supervised by Antranik Siranosian and Philip Schembri.

Under-graduate Research *Student Researcher* Apr 2010 –
Harvey Mudd College May 2011
Claremont, California, USA

Under the supervision of Dr. Philip D. Cha, developed a novel tuning method for damped TMDs for the reduction of vibration in damped, harmonically forced Euler-Bernoulli beams. Wrote and submitted a publication that was accepted to *Journal of Vibration and Acoustics*.

Student Researcher Sep 2010 –
Harvey Mudd College/Los Alamos National Laboratory May 2011
Claremont, California, USA

Worked in a five-person team to develop and experimentally verify a finite element model of wind turbine blade in ANSYS for Los Alamos National Laboratory. Supervisory team included Dr. Philip D. Cha (Harvey Mudd College) and Curt Ammerman (LANL).

PUBLICATIONS & PRESENTATIONS

Written Publications *Temporal coherence: a model for non-stationarity in natural and simulated wind records* May 2016

J. M. Rinker, H. P. Gavin, A. Clifton, P. S. Veers, and L. F. Kilcher
Boundary-Layer Meteorology

Formulated and implemented a completely novel framework for simulating nonstationary stochastic fields. Wrote manuscript, incorporated edits from co-authors, and managed revision process.

Determining the physical limits on semi-active control performance: a tutorial May 2014

P. S. Harvey, H. P. Gavin, J. Scruggs, and J. M. Rinker
Structural Control and Health Monitoring

Reviewed both the technical content and the writing quality of the paper to ensure its acceptance to the journal.

	<i>Enforcing nodes to suppress vibration along a harmonically forced damped Euler-Bernoulli beam</i>	Oct 2012
	P. D. Cha and J. M. Rinker <i>Journal of Vibration and Acoustics</i>	
	Developed and verified a novel tuning method for tuned-mass dampers to enforce locations of zero vibration in damped, harmonically forced Euler-Bernoulli beams. Wrote and submitted publication and managed revision process.	
Peer-Reviewed Conference Proceedings	<i>Calculating the sensitivity of wind turbine loads to wind inputs using response surfaces</i>	Oct 2016
	J. M. Rinker <i>The Science of Making Torque from Wind</i> , Munich, Germany	
	Independently investigated the utility of global sensitivity indices for the atmospheric model reduction for wind energy applications. Submitted abstract, wrote and revised conference paper, and managed submission process.	
	<i>Subspace identification of a 5 MW reference wind turbine</i>	Feb 2015
	J. M. Rinker and H. Gavin <i>2015 International Modal Analysis Conference</i> , Orlando, Florida	
	<i>Including SN-uncertainty in fatigue reliability analyses of wind turbines</i>	Feb 2014
	J. M. Rinker and H. Gavin <i>2014 International Modal Analysis Conference</i> , Orlando, Florida	
	<i>Tuning TMDs to "fix" floors in MDOF buildings in shear</i>	Feb 2013
	J. M. Rinker <i>2013 International Modal Analysis Conference</i> , Orange County, California	
	<i>Approximating stiffness-proportional damping with a viscoelastic model in explicit finite element analyses</i>	Jun 2012
	J. M. Rinker <i>2012 International Modal Analysis Conference</i> , Orlando, Florida	
	<i>Model calibration and validation for material damping using finite element analyses</i>	Feb 2012
	R. Menefee, J. Rinker, P. H. Shin, P. Schembri, & A. Siranosian <i>2011 International Modal Analysis Conference</i> , Jacksonville, Florida	
Presented Work	<i>Temporal coherence in wind simulation and atmospheric data</i>	Jun 2015
	J. M. Rinker and H. P. Gavin <i>2015 Symposium of the North American Wind Energy Academy</i> , Blacksburg, VA	
	Independently applied for travel funding from the graduate school to attend the conference.	
	<i>The effects of wind inputs on wind turbine characteristics</i>	May 2013
	J. M. Rinker <i>Duke Energy Research Collaboration Workshop</i> , Durham, NC	

<i>Enforcing nodes to suppress vibration along a harmonically forced damped Euler-Bernoulli beam</i>	Sep 2011
P. D. Cha and J. M. Rinker <i>International Congress on the Advances in Structural Engineering and Mechanics, Seoul, Korea</i>	
<i>Enforcing nodes in a damped elastic structure subject to harmonic forcing</i>	Nov 2010
J. M. Rinker <i>Southern California Conference on Undergraduate Research, Malibu, CA</i>	

OTHER ACTIVITIES

<i>Advanced Scientific Python Programming</i>	Sep 2017
Nikiti, Greece Attended a week-long workshop that taught advanced Python practices in scientific packages such as NumPy, Pandas, Multiprocessing, Cython, etc. Member of winning team of final tournament for the group programming project.	

LEADERSHIP ACTIVITIES

Academic	<i>Emerging Leaders Institute</i>	Apr 2014
	Duke University Graduate School Attended workshops with other ELI participants to learn valuable leadership skills such as strength identification, strategic communication, personality types, and emotional intelligence. Completed a group project with other participants on the desired career paths for graduate students and whether they were receiving adequate training with the available graduate programs.	
	<i>Graduate and Professional Student Council</i>	Aug 2013 – Aug 2014
	Civil & Environmental Engineering Representative Attended GPSC meetings and ensure that the ideas and concerns of the Civil & Environmental Engineering Graduate Students were heard and addressed. Participated in task force on improving the graduate student housing support.	
	<i>PhD+ Committee</i>	Jan 2013 – Jan 2015
	Duke University Pratt School of Engineering Designed the PhD+ program and sought accreditation for the program as a graduate certificate program centred towards graduating Ph.D. students with industry knowledge and experience. Designed a data management system to track which participants have completed which steps of the program. Brainstormed seminar and workshop topics, communicated with potential speakers, and attended committee meetings.	
	<i>Engineering Graduate Student Council</i>	Jan 2013 – Jan 2015
	Secretary, Active Member	
	<i>Basketball Committee</i>	Sep 2012 – Dec 2014
	Active Member	

**Non-
Academic**

Modal Analysis Technical Division Member
International Modal Analysis Conference

Feb 2013 –
Present

Attended Technical Division meetings at IMAC. Provided feedback on proposed strategies and future events to facilitate the introduction of new researchers into the field of modal analysis.