

Paul R. Miles

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Education:

Florida State University, Tallahassee, FL

Ph.D. Mechanical Engineering August 2017 *Dissertation:* Uncertainty Analysis of Multifunctional Constitutive Relations and Adaptive Structures
Advisors: William Oates & M. Yousuff Hussaini

Grove City College, Grove City, PA

B.S. Mechanical Engineering May 2013 *with highest honors*

Research Experience:

Postdoctoral Research Scholar - North Carolina State University

September 2017 - Present

Advisor: Ralph Smith

Funding: Consortium for Nonproliferation Enabling Capabilities (CNEC) and Air Force Office of Scientific Research (AFOSR)

- Developed models/methods for estimating radiation source location in urban environments. Areas of research include surrogate model construction, parameter subset selection, Bayesian model calibration, and uncertainty quantification.
- Programmed Python package to perform Markov Chain Monte Carlo (MCMC) simulations using the Delayed Rejection Adaptive Metropolis (DRAM) algorithm. Project repository: <https://github.com/prmiles/pymcmcstat>
- Investigated numerical methods for efficient estimation of fractional order calculus operators with applications focused on nonlinear viscoelastic modeling of soft-elastomers.

Graduate Research Assistant - Florida State University

August 2013 - August 2017

Advisors: William Oates & M. Yousuff Hussaini

Funding: Army Research Office (ARO) and National Science Foundation (NSF)

Dissertation: *Uncertainty Analysis of Multifunctional Constitutive Relations and Adaptive Structures*

- Performed uncertainty analysis of various engineering models used in smart material systems.
 - Analyzed uncertainty in student survey responses, providing insight into effectiveness of lecture material
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Teaching Experience:

Teaching Assistant - Florida State University

August 2013 - August 2017

Department: Mechanical Engineering


Supervisor: William Oates






- Provided guest lectures for a course on finite element methods and a course on continuum mechanics. Prepared and presented lecture material, graded homework, and tutored students outside of class.
 - Instructed fellow graduate students and also postdoctoral students in the use of programs designed for uncertainty quantification.
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Journal Articles:


1. Leon, L. S., **Miles, P. R.**, Smith, R. C., Oates, W. S. (2018). Active Subspace Analysis and Uncertainty Quantification for a Polydomain Ferroelectric Phase-Field Model. *Journal of Intelligent Material Systems and Structures*, submitted for review.
2. Gao, W., **Miles, P. R.**, Moura, A. G., Hussaini, M. Y., Oates, W. S. (2018). Uncertainty Analysis of Dielectric Elastomer Membranes Under Electromechanical Loading. *Smart Materials and Structures*, submitted for review.
3. Leon, L. S., Smith, R. C., Oates, W. S., **Miles, P. R.** (2018). Analysis of a Multi-Axial Quantum Informed Ferroelectric Continuum Model: Part 2—Sensitivity Analysis. *Journal of Intelligent Material Systems and Structures*, 29(13), 2840-2860. <https://doi.org/10.1177/1045389X18781024>
4. **Miles, P. R.**, Leon, L. S., Smith, R. C., Oates, W. S. (2018). Analysis of a Multi-Axial Quantum Informed Ferroelectric Continuum Model: Part 1—Uncertainty Quantification. *Journal of Intelligent Material Systems and Structures*, 29(13), 2823-2839. <https://doi.org/10.1177/1045389X18781023>
5. Mashayekhi, S., **Miles, P. R.**, Hussaini, M. Y., Oates, W. S. (2018). Fractional Viscoelasticity in Fractal and Non-Fractal Media: Theory, Experimental Validation, and Uncertainty Analysis. *Journal of the Mechanics and Physics of Solids*, 111, 134-156. <https://doi.org/10.1016/j.jmps.2017.10.013>
6. **Miles, P. R.**, Hays, M., Smith, R. C., Oates, W. S. (2015). Bayesian Uncertainty Analysis of Finite Deformation Viscoelasticity." *Mechanics of Materials*, 91, 35-49. <https://doi.org/10.1016/j.mechmat.2015.07.002>

Refereed Conference Proceedings:

 Presented at Conference

1.  **Miles, P. R.**, Pash, G. T., Oates, W. S., Smith, R. C. (2018, September). Numerical Techniques to Model Fractional-Order Nonlinear Viscoelasticity in Soft Elastomers. In *ASME 2018 Conference on Smart Materials, Adaptive Structures and Intelligent Systems* (). American Society of Mechanical Engineers. <http://dx.doi.org/10.1115/SMASIS2018-8102>
2. Gao, W., Oates, W. S., **Miles, P. R.**, Smith, R. C. (2018, September). Application of the Maximum Entropy Method to Multifunctional Materials for Data Fusion and Uncertainty Quantification. In *ASME 2018 Conference on Smart Materials, Adaptive Structures and Intelligent Systems* (). American Society of Mechanical Engineers. <http://dx.doi.org/10.1115/SMASIS2018-7960>
3.  **Miles, P. R.**, Oates, W. S., Leon, L. S., Smith, R. C. (2017, September). Uncertainty Analysis of Ferroelectric Polydomain Structures. In *ASME 2017 Conference on Smart Materials, Adaptive Structures and Intelligent Systems* (pp. V001T02A008-V001T02A008). American Society of Mechanical Engineers. <http://dx.doi.org/10.1115/SMASIS2017-3916>
4. Leon, L. S., Smith, R. C., Oates, W. S., **Miles, P. R.** (2017, September). Identifiability and Active Subspace Analysis for a Polydomain Ferroelectric Phase Field Model. In *ASME 2017 Conference on Smart Materials, Adaptive Structures and Intelligent Systems* (pp. V002T03A022-V002T03A022). American Society of Mechanical Engineers. <http://dx.doi.org/10.1115/SMASIS2017-3845>
5. Leon, L. S., Smith, R. C., Oates, W. S., **Miles, P. R.** (2016, September). Sensitivity Analysis for a Quantum Informed Ferroelectric Energy Model. In *ASME 2016 Conference on Smart Materials, Adaptive Structures and Intelligent Systems* (pp. V001T02A001-V001T02A001). American Society of Mechanical Engineers. <http://dx.doi.org/10.1115/SMASIS2016-9035>
6.  **Miles, P. R.**, Guettler, A., Hussaini, M. Y., Oates, W. S. (2015, September). Uncertainty Analysis of Dielectric Elastomer Membranes Under Multi-Axial Loading. In *ASME 2015 Conference on Smart Materials, Adaptive Structures and Intelligent Systems* (pp. V001T02A004-V001T02A004). American Society of Mechanical Engineers. <http://dx.doi.org/10.1115/SMASIS2015-8919>
7.  **Miles, P. R.**, Hays, M., Smith, R. C., Oates, W. S. (2014, September). Uncertainty Analysis of a Finite Deformation Viscoelastic Model. In *ASME 2014 Conference on Smart Materials, Adaptive Structures and Intelligent Systems* (pp. V002T02A001-V002T02A001). American Society of Mechanical Engineers. <http://dx.doi.org/10.1115/SMASIS2014-7440>
8.  **Miles, P. R.**, Archibald, C. M. (2013, November). Experimental Investigation of Bicycle Frame FEA Models. In *ASME 2013 International Mechanical Engineering Congress and Exposition* (pp. V013T14A043-V013T14A043). American Society of Mechanical Engineers. <http://dx.doi.org/10.1115/IMECE2013-62255>

Non-Refereed Conference Proceedings:

 Presented at Conference

9.  Solheim, H., Stanisauskis, E., **Miles, P. R.**, Oates, W. S. (2018, March) Fractional Viscoelasticity of Soft Elastomers and Auxetic Foams. In *Behavior and Mechanics of Multifunctional Materials and Composites 2018* (Vol. 10596, p. 1059604). International Society for Optics and Photonics. <https://doi.org/10.1117/12.2296666>
10. Leon, L., Smith, R. C., **Miles, P. R.**, Oates, W. (2018, March). Active Subspace Uncertainty Quantification for a Polydomain Ferroelectric Phase-Field Model. In *Behavior and Mechanics of Multifunctional Materials and Composites 2018* (Vol. 10596, p. 105960T). International Society for Optics and Photonics. <https://doi.org/10.1117/12.2297207>
11. Oates, W. S., **Miles, P. R.**, Gao, W., Clark, J., Mashayekhi, S., Hussaini, M.Y. (2017, April). Rate Dependent Constitutive Behavior of Dielectric Elastomers and Applications in Legged Robotics. In *Electroactive Polymer Actuators and Devices (EAPAD) 2017* (Vol. 10163, p. 1016316). International Society for Optics and Photonics. <http://dx.doi.org/10.1117/12.2260185>
12.  **Miles, P. R.**, Leon, L. S., Smith, R. C., Oates, W. S. (2017, April). Uncertainty Analysis of Continuum Phase Field Modeling in 180 Degree Domain Wall Structures. In *Behavior and Mechanics of Multifunctional Materials and Composites 2017* (Vol. 10165, p. 1016509). International Society for Optics and Photonics. <http://dx.doi.org/10.1117/12.2260130>
13. Leon, L. S., Smith, R. C., Oates, W. S., **Miles, P. R.** (2017, April). Global Sensitivity Analysis for a Quantum Informed Ferroelectric Phase Field Model. In *Behavior and Mechanics of Multifunctional Materials and Composites 2017* (Vol. 10165, p. 1016508). International Society for Optics and Photonics. <http://dx.doi.org/10.1117/12.2259945>
14. Oates, W. S., **Miles, P. R.**, Leon, L. S., Smith, R. C. (2016, April). Uncertainty Analysis of Continuum Scale Ferroelectric Energy Landscapes Using Density Functional Theory. In *Behavior and Mechanics of Multifunctional Materials and Composites 2016* (Vol. 9800, p. 980004). International Society for Optics and Photonics. <http://dx.doi.org/10.1117/12.2219273>
15. Oates, W. S., Hays, M., **Miles, P. R.**, Smith, R. C. (2013, April). Uncertainty Quantification and Stochastic-Based Viscoelastic Modeling of Finite Deformation Elastomers. In *Electroactive Polymer Actuators and Devices (EAPAD) 2013* (Vol. 8687, p. 868710). International Society for Optics and Photonics. <http://dx.doi.org/10.1117/12.2009706>
16.  **Miles, P. R.**, Archibald, C. M. (2012, March). Experimental Determination of Operational Pedal Cycle Frame Loads. In *ASME North Central Section Conference 2012*.

Leadership & Teamwork:

Mentor - Research Experience for Undergraduates (REU) – FSU

June – August, 2015 & 2017

- Supervised research of undergraduate students in the REU-MASS and REU-RETREAT programs, hosted by FSU's Aerospace, Mechatronics, and Energy Center (AME) and High-Performance Material Institute (HPMI), respectively.
- Taught students appropriate techniques for experimental data collection, theoretical model development, and computational analysis.
- Characterized viscoelastic, thermal, and fractal properties of different dielectric elastomers and auxetic foams.

Student Chair - ASME Human Powered Vehicle Challenge East 2012

April 2011 - May 2012

- Coordinated efforts of over 80 student volunteers. Event saw 300+ student participants from across the country.
- Communicated with local businesses and school officials in order to set up courses for the racing and design events.

Technical Skills:

- Operating Systems: Linux, Mac OSX, Windows XP/Vista/7/8/10
- Programming Languages: Python, MATLAB, Fortran 90/95, Mathematica, EES, C++
- Tools: GitHub, Anaconda, FEniCS, Valgrind, COMSOL Multiphysics, Creo Elements/Pro

Honors & Awards:

- Graduated *summa cum laude* from Florida State University
 - Graduated *summa cum laude* with Highest Honors in Mechanical Engineering from Grove City College
 - Best Student Paper Award in Mechanics & Behavior of Active Materials in American Society of Mechanical Engineers Conference on Smart Materials, Adaptive Structures, and Intelligent Systems
 - Florida State University's Legacy Fellowship
 - Omicron Delta Kappa National Leadership Honor Society
 - Mortar Board National College Senior Honor Society.
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