

RICHARD WIEBE

Curriculum Vitae

Department of Civil and Environmental Engineering
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EDUCATIONAL HISTORY

Duke University, Durham, NC, USA
Ph.D., Civil and Environmental Engineering
December 2012

“Nonlinear Dynamics of Discrete and Continuous Mechanical Systems with Snap-Through Instabilities”

University of Waterloo, Waterloo, ON, Canada
M.A.Sc., Civil and Environmental Engineering
August 2009

“Stability of a Structural Column under Stochastic Axial Loading”

Lakehead University, Thunder Bay, ON, Canada
B.Eng., Civil Engineering
June 2007

EMPLOYMENT HISTORY

University of Washington
Seattle, WA, USA
Assistant Professor, Civil and Environmental Engineering, 2014 – present

Air Force Research Laboratory (Contracted through Universal Technology Corporation)
Dayton, OH, USA
Post-Doctoral Researcher, 2013 – 2014

Duke University
Durham, NC, USA
Post-Doctoral Researcher, Mechanical Engineering and Materials Science, 2013

Duke University
Durham, NC, USA
Research and Teaching Assistant, Civil and Environmental Engineering, 2009 - 2012

University of Waterloo
Waterloo, ON, Canada
Teaching Assistant, Civil and Environmental Engineering, 2007 – 2009

AWARDS AND HONORS

Young Investigator Research Program (YIP) Award, 2019, Air Force Office of Scientific Research

Chair's Award for Outstanding Teaching, 2018, Department of Civil and Environmental Engineering, University of Washington

Canada Graduate Scholarship, 2009, Natural Sciences and Engineering Research Council of Canada

PUBLICATIONS

Refereed archival journal publications

1. R. Wiebe and P.S. Harvey, "Technical Brief: On the Euler-Lagrange equation for systems of planar rigid-bodies or lumped masses", *Journal of Nonlinear and Computational Dynamics*, Accepted.
2. H.-G. Kim¹ and R. Wiebe, "Dynamic snap-through boundaries of composite plates: an experimental and computational study", *Journal of Sound and Vibration*, Vol. 439, pp. 362-387, 2019.
3. P.F. Babuska¹, R. Wiebe, and M.R. Motley, "A beam finite element for analysis of composite beams with the inclusion of bend-twist coupling", *Composite Structures*, Vol. 189, pp. 707-717, 2018.
4. T. Li², J.W. Berman, and R. Wiebe, "Parametric study of seismic performance of rocking structures with multiple rocking joints", *Engineering Structures*, Vol. 146, pp. 75-92, 2017.
5. M. Nistor³, R. Wiebe, and I. Stanciulescu, "Relationship between Euler buckling and unstable equilibria of transversely loaded bistable beams", *International Journal of Non-Linear Mechanics*, Vol. 95, pp. 151-161, 2017.
6. R.B. Barber, C.S. Hill, P.F. Babuska¹, M.R. Motley, and R. Wiebe, "Flume-scale testing of an adaptive pitch marine hydrokinetic turbine", *Composite Structures*, Vol. 168, pp. 465-473, 2017.
7. R. Perez, G. Bartram, T. Bebernis, R. Wiebe, and S.M. Spottswood, "Calibration of aero-structural reduced order models using full-field experimental measurements", *Mechanical Systems and Signal Processing*, Vol. 86, Part B, pp. 49-65, 2016.
8. R. Wiebe and L.N. Virgin, "On the experimental identification of unstable static equilibria", *Proceedings of the Royal Society A, Mathematical, Physical, and Engineering Sciences*, Vol. 472, No. 2190, pp. 20160172, 2016.
9. R. Wiebe and S.M. Spottswood, "On the dimension of complex responses in nonlinear structural vibrations", *Journal of Sound and Vibration*, Vol. 373, pp. 192-204, 2016. (IF: 2.618, GS: 7 citations)
10. R. Wiebe and I. Stanciulescu, "Inconsistent stability of Newmark's method in structural dynamics applications", *Journal of Computational and Nonlinear Dynamics*, Vol. 10, No. 5, pp. 051006, 2015.
11. R. Wiebe, L.N. Virgin, and S.M. Spottswood, "Stochastic interrogation of competing responses in a nonlinear distributed system", *Nonlinear Dynamics*, Vol. 79, No. 1, pp. 607-615, 2015.
12. R. Wiebe and S.M. Spottswood, "Co-existing responses and stochastic resonance in post-buckled structures: a combined numerical and experimental study", *Journal of Sound and Vibration*, Vol. 333, No. 19, pp. 4682-4694, 2014.
13. L.N. Virgin, R. Wiebe, S.M. Spottswood, and T.G. Eason "Sensitivity in the structural behavior of shallow arches", *International Journal of Nonlinear Mechanics*, Vol. 58, pp. 212-221, 2014.
14. J.J. Waite, L.N. Virgin, and R. Wiebe, "Competing responses in a discrete mechanical system", *International Journal of Bifurcations and Chaos*, Vol. 24, No. 1, pp. 1430003, 2014.
15. Y. Chandra, R. Wiebe, I. Stanciulescu, L.N. Virgin, S.M. Spottswood, and T.G. Eason, "Characterizing dynamic transitions associated with snap-through of clamped shallow arches", *Journal of Sound and Vibration*, Vol. 332, No. 22, pp. 5837-5855, 2013.
16. P.S. Harvey, R. Wiebe, and H.P. Gavin, "On the chaotic response of a nonlinear rolling isolation system", *Physica D: Nonlinear Phenomena*, Vols. 256-257, pp. 36-42, 2013.

17. L.N. Virgin and R. Wiebe, “On damping in the vicinity of critical points”, *Philosophical Transactions of the Royal Society A, Mathematical, Physical, and Engineering Sciences*, Vol. 371, No. 1993, pp. 20120426, 2013.
18. R. Wiebe, L.N. Virgin, I. Stanciulescu, S.M. Spottswood, and T. G. Eason, “Characterizing dynamic transitions associated with snap-through: a discrete system”, *Journal of Computational and Nonlinear Dynamics*, Vol. 8, No. 1, pp. 011010, 2012.
19. R. Wiebe, L.N. Virgin, and T.P. Witelski, “A parametrically forced nonlinear system with reversible equilibria”, *International Journal of Bifurcation and Chaos*, Vol. 22, No. 6, pp. 1230020, 2012.
20. R. Wiebe and L.N. Virgin, “A heuristic method for identifying chaos from frequency content”, *Chaos: An Interdisciplinary Journal of Nonlinear Science*, Vol. 22, pp. 013136, 2012.

Conference proceedings and other non-journal articles

Fully refereed

1. T. van Iderstein¹ and R. Wiebe, “Experimental path following of unstable static equilibria for snap through buckling”, 36th SEM International Modal Analysis Conference, Orlando, FL, USA, February, 2018.
2. T. Sprague, T. van Iderstein¹, R. Wiebe, “Parameters of structural design: analyses of Jack Christiansen's segmental hyperbolic paraboloid shells”, Proceedings of the International Association for Shell and Spatial Structures Conference, July, 2018.
3. R. Wiebe, M. Nistor³, I. Stanciulescu “On Euler buckling and snap-through”, 36th SEM International Modal Analysis Conference, Orlando, FL, USA, February, 2018.
4. R. Wiebe and T. Li², “Free dynamics of multi-block rocking assemblies”, ASME International Design Engineering Technical Conferences, Cleveland, OH, August, 2017.
5. R.B. Barber, C.S. Hill, P.F. Babuska¹, A. Aliseda, R. Wiebe, and M.R. Motley, “Adaptive composites for load control in marine turbine blades”, 36th International Conference on Ocean, Offshore and Arctic Engineering, Trondheim, Norway, June, 2017.
6. R.B. Barber, C.S. Hill, P. Babuska¹, M.R. Motley, A. Aliseda, and R. Wiebe, “Adaptive pitch marine hydrokinetic turbine blades: experimental loading, performance and wake imaging”, 5th annual Marine Energy Technology Symposium, Washington, DC, USA, May, 2017.
7. H.-G. Kim¹ and R. Wiebe, “Experimental nonlinear dynamics and snap-through of post-buckled composite plates”, 35th SEM International Modal Analysis Conference, Orange County, CA, USA, February, 2017.
8. T. Y. Yang¹ and R. Wiebe, “Experimental study on the effect of large axial tensile force on the natural frequency of a fixed- fixed steel beam” 35th SEM International Modal Analysis Conference, Orange County, CA, USA, February, 2017.
9. R. Wiebe and W.-C. Xie, “Stability of a nonlinear second order equation under parametric bounded noise excitation”, 12th Recent Advances in Structural Dynamics Conference, Southampton, UK, July, 2016.
10. R.A. Perez, R. Wiebe, and S.M. Spottswood, “Robust simulation of buckled structures using reduced order modeling”, 12th Recent Advances in Structural Dynamics Conference, Southampton, UK, July, 2016.
11. L.N. Virgin and R. Wiebe, “Inferring unstable equilibrium configurations from experimental data”, 12th Recent Advances in Structural Dynamics Conference, Southampton, UK, July, 2016.
12. H.-G. Kim¹ and R. Wiebe, “Experimental nonlinear dynamics of laminated quasi isotropic thin composite plates”, 34th SEM International Modal Analysis Conference, Orlando, FL, USA, February, 2016.
13. R. Wiebe and D. Ehrhardt, “Experimental nonlinear dynamics and chaos of post-buckled plates”, 34th SEM International Modal Analysis Conference, Orlando, FL, USA, February, 2015. (GS: 2 citations)
14. G. Bartram, R.A. Perez, R. Wiebe, and B.P. Smarslok, “Uncertainty quantification of state boundaries in thin beam buckling experiments”, 17th AIAA SciTech Forum Non-Deterministic Approaches Conference, Kissimmee, FL, USA, January, 2015.

15. R. Wiebe and S.M. Spottswood, “Experimental snap-through and stochastic resonance in a nonlinear structure”, 8th European Nonlinear Dynamics Conference, Vienna, Austria, July, 2014. (GS: 0 citations)
16. R. Wiebe and S.M. Spottswood, “Nonlinearity and dimensionality: experiments and modeling of complex behavior in distributed structures”, 17th U.S. National Congress on Theoretical & Applied Mechanics, East Lansing, MI, USA, June, 2014.
17. R. Wiebe and S.M. Spottswood, “Complex behavior of a buckled beam under combined harmonic and random loading”, 33rd SEM International Modal Analysis Conference, Orlando, FL, USA, February, 2014.
18. L.N. Virgin, J.J. Waite, and R. Wiebe, “Co-existing responses in a harmonically excited nonlinear structural system”, 33rd SEM International Modal Analysis Conference, Orlando, FL, USA, February, 2014.
19. R. Wiebe, L.N. Virgin, S.M. Spottswood, and T. G. Eason, “Dynamic instability in an apparently simple experimental structure”, 11th Recent Advances in Structural Dynamics Conference, Pisa, Italy, July, 2013.
20. R. Wiebe and L.N. Virgin, “A harmonic balance approximation of dynamic snap-through boundaries in a single-degree-of-freedom structure”, ASME International Design Engineering Technical Conferences, Portland, OR, USA, August, 2013.
21. R. Wiebe and L.N. Virgin, “On the identification of chaos from frequency content”, ASME International Design Engineering Technical Conferences, Washington, DC, USA, August, 2011.
22. R. Wiebe, L.N. Virgin, I. Stanciulescu, and S. M. Spottswood, “On snap-through buckling”, 52nd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Denver, CO, USA, April, 2011.
23. A. Lloyd, R. Wiebe, and T. Tikka, “Equation for thermal profiles of normal strength siliceous aggregate concrete columns exposed to fire” Annual Conference of the Canadian Society for Civil Engineering, Quebec City, QC, Canada, January, 2008.

Refereed by abstract only

1. R. Wiebe, “Damping characteristics in nonlinear oscillators near transcritical bifurcations”, Accepted for the ASME IDETC conference, Anaheim CA, August, 2019.
2. R. Wiebe, H. Yasuda, J.K. Yang “Nonlinear dynamic behavior of origami-based multi-cell structures”, ASME International Design Engineering Technical Conferences, Cleveland, OH, USA, August, 2017.
3. R. Wiebe, “Root finding using dynamic relaxation with applications in stability and structural dynamics”, ASME International Design Engineering Technical Conferences, Cleveland, OH, USA, August, 2017.
4. H.-G. Kim¹, C.-P. Lin¹, R. Wiebe, M.R. Motley, “Damage detection in composite plates subjected to large deformations”, Engineering Mechanics Institute Conference, Nashville, TN, USA, May, 2016.
5. R.A. Perez, G. Bartram, R. Wiebe, and B.P. Smarslok, “Bayesian calibration of thermal buckling models for thin panels”, SIAM conference on uncertainty quantification, Savannah, GA, USA, April, 2014.
6. L.N. Virgin, R. Wiebe, “Dynamic snap-through of shallow arches”, ASME International Design Engineering Technical Conferences, Portland, OR, USA, August, 2013.
7. L.N. Virgin, R. Wiebe, T.P. Witelski, “A system with reversible equilibria”, IUTAM Symposium, Aberdeen, Scotland, July, 2010.

OTHER SCHOLARLY ACTIVITY

Invited lectures and seminars

1. Department of Mechanical Engineering and Materials Science, Duke University, *Two studies on buckling, snap-through, and unstable equilibria in post-buckled structures*, August 26, 2016.
2. Department of Civil and Environmental Engineering, Vanderbilt University, *Chaos, Fractals, and More: Nonlinear Dynamics of Structural Engineering Systems*, March 31, 2014.
3. Department of Civil Engineering, Purdue University, *The Search for Order in Chaos: Several Experiments in Nonlinear Dynamics of Structures*, February 18, 2014.
4. Department of Civil and Environmental Engineering, Rice University, *Uncovering Hidden Behaviors in Nonlinear Structures: Stochastic Interrogation of Competing Responses in Discrete and Distributed Mechanical Systems*, February 14, 2014.
5. Department of Mechanical and Materials Engineering, University of Cincinnati, *Complex Behavior and Nonlinear Dynamics of Structures*, January 24, 2014.

Professional society memberships

- American Society of Civil Engineers
- American Society of Mechanical Engineers
- American Institute of Aeronautics and Astronautics
- Society for Experimental Mechanics

SERVICE

- Steel Bridge Faculty Advisor, 2018 - present
- CEE Structures Graduate Program Coordinator, 2018 – present
- CEE Undergraduate Education Chair, 2017-2018
- CEE Departmental Committees – Graduate Education (2018 - present), Undergraduate Education (Chair, 2014-2018)
- CEE Faculty Search Executive Committee – Structures (2015)

Referee/Reviewer

Journal of Sound and Vibration, Nonlinear Dynamics, Materials and Design, Journal of Dynamic Behav. Of Matls., Shock and Vibration, Applied Mathematical Modeling, International Journal of Nonlin. Mech., Engineering Structures, ASME Journal of Applied Mechanics, Journal of Spacecraft and Rockets, Advances in Structural Engineering, Journal of Aerospace Engineering, European Journal of Mech. A/Solids, Journal of Engineering Mechanics, Journal of Vibration and Acoustics, Probabilistic Engineering Mechanics, Mechanical Systems and Signal Proc., Chaos, Finite Elem. in Analysis and Design, Meccanica, Physics Letters A