Section 06: Curriculum Vitae

Joshua A. Schultz, Ph.D., P.E., LEED AP

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Education

Ph.D. Civil/Structural Engineering — May 2013
Marquette University, WI, USA

Dissertation title: *"Lateral-Mode Vibration of Microcantilever-Based Sensors in Viscous Fluids Using Timoshenko Beam Theory"*

Advisor: Stephen M. Heinrich, PhD

M.S. Structural Engineering — May 2009
Milwaukee School of Engineering, WI, USA

Thesis title: "*Design of fully tempered monolithic structural glass with point supports based on ultimate stresses and stress distributions*"

Advisor: Douglas Stahl, Ph.D., P.E.

B.S. Architectural Engineering — May 2009
Milwaukee School of Engineering, WI, USA

Professional Licensure

Professional Engineer, California #84402	May 2015
LEED AP v2.1, USGBC #0010012237	June 2005
ENV SP, Envision Sustainability Professional	Nov. 2015

Professional Experience

Gonzaga University, Spokane, WA, USA — Aug. 2016-Present
Assistant Professor, Department of Civil Engineering
Courses taught and developed (U -Undergraduate; G-Graduate)

- CENG 302L (U) Construction Materials Lecture and Laboratory
- ENSC 205 (U) Vector Mechanics (Statics)
- CENG 473 (U) Foundation Design (senior technical elective)
- ENSC 301 (U) Mechanics of Materials
- CENG 422 (U) Structural Analysis II (senior technical elective)
- CENG 491/492 (U) Senior Design I and II
- ENSC 483 (U) Façade Design (independent study)
- ENSC 483 (U) Structural Steel Robustness (independent study)

Michigan Technical University, Houghton, MI, USA — July 2020-Present
Associate Graduate Faculty, Department of Civil Engineering

- Supervised PhD student and served on graduate committee

Schultz Engineering, Spokane WA, USA — Aug. 2016-Present
Owner (*part-time* position)

- Miscellaneous structural consulting on a wide range of projects

Professional Experience (cont.)

PFS TECO, Cottage Grove, WI, USA May 2018-Present
Building Products Engineer (*part time, remote* position)

- Perform building product certifications, audits, site-visits, peer evaluations and recommendations
- Prepare structural calculations for internal use, develop and deploy building product quality metrics and documentation

Milwaukee School of Engineering, Milwaukee, WI, USA July 2014-July 2016
Clinical Assistant Professor and Program Director (*full-time* position)

- Taught undergraduate and graduate courses in Civil and Architectural Engineering and Construction Management Department
- Served as Program Director for the MBA in STEM Leadership Program
- Served as Director of the STEM Department

Courses taught and developed (U -Undergraduate; G-Graduate)

- AE200 (U) Strengths of Materials
- AE-892 (G) Structural Engineering Design II
- AE-890 (G) Structural Engineering Design I
- AE-800 (G) Research and Presentation
- AE-6218 (G) Advanced Structural Analysis

Skidmore Owings and Merrill, Chicago, IL, USA Oct. 2012-June 2014
Structural Engineer (*full-time* position)

- Performed structural analysis and design for a range of projects including: NATO Headquarters, One World Trade Center, SLB Timber Tower Project, Pertamina Energy Tower, Kunming Financial Tower, Shenzhen Bank Headquarters, Address Residences Sky View, Mashreq Bank Headquarters.
- Performed calculations and documentation for graphic statics and structural optimization

Marquette University, Milwaukee, WI, USA June 2009-May 2012
Graduate Research Assistant (RA), MEMS Research Group

- Investigated impact of Timoshenko Beam effects and support compliance on microcantilever frequency and quality factor for sensor applications
- Performed numerical and FEA analysis using MATLAB, ANSYS and ABAQUS to determine impact of Timoshenko, geometric and material parameters on beam response
- Established a novel analytical equation for determination of quality factor for Timoshenko beams in terms of fundamental system parameters for use as sensors and energy harvesters

Stutzki Engineering, Milwaukee, WI, USA 2008-2012
Engineering intern (*full-time* summers and *part-time* during school)

- Analyze and design structural glazing applications: glass stairs, glass balustrade, curtainwall, grid shell structures etc.
- Develop ABAQUS script for meshing around holes in PSG

Publications

Refereed Journals *(Italicized Author – Student)*

Schultz, J.A. and Henriksson, V. (2021). Structural assessment of St. Charles hyperbolic paraboloid roof. *Curved and Layered Structures*, *8*(1), pp.157-166.

Raebel, C.H., **Schultz, J.A.**, and *Whitsell, B.* (2020). Experimental investigation into acceptable design methods for cold-formed metal deck. *Journal of Constructional Steel Research*, 172, 106176.

Milacek, M., **Schultz, J.A.,** and Muszynski, M.R. (2020). "Multiobjective Comparative Analysis of Alternative Structural Systems for Low-Income Housing," Journal of Architectural Engineering, 26(2), p.02520001.

Schultz, J. A., and *Jesse, J. D.* (2020). Simplified Stress Design of Helicoidal HSS Beams. *Journal of Architectural Engineering*, 26(1), 04019020.

Schultz, J.A., and Raebel, C.H. (2019). Vibrational characterization of in-situ stair performance using energy-harvester data. *International Journal of Recent Advances in Multidisciplinary Research*. 6(1), pp 4422-4429.

Schultz, J.A., Heinrich, S.M., Josse, F., Dufour, I., Nigro, N.J., Beardslee, L.A., and Brand, O. (2015). Lateral-Mode Vibration of Microcantilever-based Sensors in Viscous Fluids Using Timoshenko Beam Theory. *Journal of Microelectromechanical Systems***,** 24(4) DOI:10.1109/JMEMS.2014.2354596, pp. 848-860.

Schultz, J., Heinrich, S., Josse, F., Nigro, N., Dufour, I., Beardslee, L., and Brand, O. (2013). Timoshenko Beam Effects in Lateral-Mode, Microcantilever-based Sensors in Liquids. *Micro and Nano Letters Special Issue*. 8(11), 762-765.

Beghini, A., Beghini, L. L., **Schultz, J. A.**, Carrion, J., & Baker, W. F. (2013). Rankine's theorem for the design of cable structures. *Structural and Multidisciplinary Optimization*, *48*(5), 877-892.

Schultz, J., Stahl, D., & Stutzki, C. (2012). Experimental investigation of numerical design method for point-supported glass. *Journal of architectural engineering*, *18*(3), 223-232.

Refereed Conference Proceedings

Schultz, J.A., *Geist, P., Whitsell, B.,* and *Dorr, R.* (2021, September). Experimental Testing of Optimized Trusses. In *IABSE Congress Ghent 2021 - Structural Engineering for Future Societal Needs*, Ghent, Belgium: International Association for Bridge and Structural Engineering. p868-876.

Schultz, J.A., and Muszynski, M.R. (2021, September) Small-Scale Testing for Feasibility of Rubblized Concrete Foundations. In *IABSE Congress Ghent 2021 - Structural Engineering for Future Societal Needs*, Ghent, Belgium: International Association for Bridge and Structural Engineering. p159-165.

Schultz, J.A., and Katz, N. (2020, June). Geometric Patterns as Architectural Forms: A Case-Study in Development of a Taxonomy of Tilings. In *Proceedings of the Façade Tectonics World Congress 2020*, Los Angeles, California: Façade Tectonics Institute.

Refereed Conference Proceedings (cont.)

Schultz, J.A., Dichone, B., and *Cope, B*, (2020, June). Analytical Model for 5-ply Cross-Laminated Timber. In *Proceedings of the IWSS2020 1st Italian Workshop on Shell and Spatial Structures*: Torino, Italy: International Association for Shell and Spatial Structures. https://sites.google.com/view/iwss2020

Schultz, J.A., (2020, June). Historic Assessment of Folded Hyperbolic Paraboloid Roof: St. Charles. In *Proceedings of the IWSS2020 1st Italian Workshop on Shell and Spatial Structures*, Torino, Italy: International Association for Shell and Spatial Structures. https://sites.google.com/view/iwss2020

Milacek, M., **Schultz, J.A.**, and Muszynski, M.R., (2019, September). Revisiting Low Income Residential Construction Options in Spokane. In *Proceedings of the 2019 IABSE Congress*, New York, United States: International Association of Bridge and Structural Engineers.

Schultz, J.A., and *Hickman, S.*, (2019, September). Experimental Characterization and Material Optimization of 3-Ply CLT Panels for Residential Use. In *Proceedings of the 2019 IABSE Congress*, New York, United States: International Association of Bridge and Structural Engineers.

Jesse, J. D., & **Schultz, J**. (2018, April). Simplified design methods for HSS helicoidal steel beams. In *Structures Congress 2018: Buildings and Disaster Management* (pp. 68-79). Reston, VA: American Society of Civil Engineers.

Schultz, J.A., Knowles, J., and *Kedar, M.*, (2018, March). Glass Strength Under Point Loading: Parametric Determination of Probability of Breakage for Typical Lite Dimensions. In *Proceedings of the Façade Tectonics World Congress 2018*, Los Angeles, CA: Façade Tectonics Institute.

Schultz, J.A., and Katz, N. (2018, March). Origami-Inspired façade Design: Parametric Studies for Architectural and Structural Efficiency. In *Proceedings of the Façade Tectonics World Congress 2018*, Los Angeles, CA: Façade Tectonics Institute.

Schultz, J.A., (2017). Comparison of CLT Design Methods to Composite Beam Theory. In *Proceedings of the 39th IABSE Symposium*, Vancouver, Canada: International Associated of Bridge and Structural Engineers.

Schultz, J.A., Knowles, J., and Morse, S., (2017). Glass Failure Prediction Model for Out-of-Plane Bending of Waterjet-Drilled Holes. In *Proceedings of the 39th IABSE Symposium*, Vancouver, Canada: International Associated of Bridge and Structural Engineers.

Cervenka, J., **Schultz, J.A.,** Stahl, D., and Knowles, J., (2016). Strength of Point-Supported Glass: Influence of Stress Concentrations and Drilling Defects in Monolithic Tempered Glass Plates. In *Proceedings of the Façade Tectonics World Congress 2016*, Los Angeles, CA: Façade Tectonics Institute.

Johnson, B., **Schultz, J.,** Horos, D., and Baker, W., (2015, March). Review of CLT Seismic Resistance and New Connection Concepts. In *Proceedings, ASCE AEI Conference: Birth and Life of the Integrated Building*, Milwaukee, WI: American Society of Civil Engineers.

Schultz, J., and Kuba, M., (2015, March). Parametric Studies of Point-Supported Laminated Glass for Simplified Design. In *Proceedings, ASCE AEI Conference: Birth and Life of the Integrated Building*, Milwaukee, WI: American Society of Civil Engineers.

Refereed Conference Proceedings (cont.)

Raebel, C and **Schultz, J.,** (2015, March). Response of Meso-Scale Energy Harvesters Coupled with Dynamic Floor Systems. In *Proceedings, ASCE AEI Conference: Birth and Life of the Integrated Building*, Milwaukee, WI: American Society of Civil Engineers.

Baker, W., Horos, D., Johnson, B., and **Schultz, J.,** (2014, April). Timber Tower Research: Concrete Jointed Timber Frame. In *Proceedings, ASCE Structures Congress*, Boston, MA: American Society of Civil Engineers.

Schultz, J., Raebel, C., and *Huberty, A.*, (2014, February). Numerical Modeling of Steel-Framed Floors for Energy Harvesting Applications. In *Proceedings, SEM IMAC XXII Conference & Exposition on Structural Dynamics*, Orlando, FL: Society for Experimental Mechanics.

Schultz, J., and Johnson, B., (2014, February). Evaluation of North American Vibration Standards for Mass-timber Floors. In *Proceedings, SEM IMAC XXII Conference & Exposition on Structural Dynamics*, Orlando, FL: Society for Experimental Mechanics.

Schultz, J., and Kuba, M., (2013, August). Investigation of Equivalent Dynamic Material Properties of Structural Laminated Glass. In *Proceedings, 2013 ASCE Conference for Engineering Mechanics Institute*. Northwestern, IL: American Society of Civil Engineers.

Schultz, J., Heinrich, S., Josse, F., Nigro, N., Dufour, I., Beardslee, L., and Brand, O., (2013, May). Timoshenko Beam Effects in Lateral-Mode, Microcantilever-based Sensors in Liquids. In *Proceedings, 10th International Nanomechanical Sensing Conference (NMC)*. Stanford, CA:

Schultz, J., Heinrich, S.M., Josse, F., Dufour, I., Nigro, N.J., Beardslee, L.A., and Brand, O., (2013, June). Timoshenko Beam Model for Lateral Vibration of Liquid-Phase Microcantilever-based Sensors. In *Proceedings of 14th International Symposium on MEMS and Nanotechnology, SEM 2013 Annual Conference & Exposition on Experimental and Applied Mechanics*, Lombard, IL, June 3-6, 2013, Paper 155, 10 pp.; MEMS and Nanotechnology, Volume 5, Conference Proceedings of the Society for Experimental Mechanics Series, pp 115-124.

Schultz, J., and Raebel, C., (2013, February). Analysis and Optimization of MEMS Energy Harvesting for Floor Vibrations. In *Proceedings, SEM IMAC XXI Conference & Exposition on Structural Dynamics*, Garden Grove, CA: Society for Experimental Mechanics.

Schultz, J., and Raebel, C., (2012, March). MEMS Energy Harvesting of Ambient Floor Vibrations as Sustainable Power Source. In *Proceedings, 1st Annual Renewable Energy Summit*. Milwaukee, WI: RENEW Wisconsin.

Electronic Journals and magazines

Schultz J.A., "Structural Glass Design using Glass Failure Prediction Model" STATE EQUILIBRIUM: Newsletter of the Structural Engineers Association of Washington, June 2020, https://files.constantcontact.com/07ea59f7701/0ef85acb-92f6-49c5-955a-2cac6dddae0a.pdf.

Khatchadourian, A., **Schultz, J.**, and Bollman, M., Project Lead The Way Design Guide 2015, Milwaukee School of Engineering. *PLTW-WI Press*. October 17, 2014.

Knowles, J., **Schultz, J.A.,** and Stutzki, C., "Breaking Architectural Barriers with Structural Glass," *SIMULIA Realistic Simulation News*. January/February 2011, pp. 10-11.

Knowles, J., Stutzki, C., **Schultz, J.A.,** and Kuba, M., "Dynamic Modeling of Structural Glass Components." *Proceedings,* SIMULIA Central Regional Conf., Dassault Systemes and Abaqus, Naperville, IL, September 28, 2010.

Research Reports
Baker, W.F., Horos, D.R., Johnson, B.M. and Schultz, J.A., Skidmore, Owings, and Merrill, LLP. Timber Tower Research Project Initial Report. May 6, 2013, 105pp

Baker, W.F., Horos, D.R., Johnson, B.M. and Schultz, J.A., Skidmore, Owings, and Merrill, LLP. Timber Tower Research Project System Report. May 30, 2014, 72pp

Invited Presentations

"St. Charles Parish Gains New Interest For Unique, Historic Roof" NPR Interview, May 3, 2021. Rebecca White. https://www.spokanepublicradio.org/post/st-charles-parish-gains-new-interest-unique-historic-roof#stream/0

"Architectural and Structural Glass Design" 2021 AIA Spokane Webinar Series, June 15, 2021. https://www.aia.org/events/6404116-architectural-and-structural-glass-design

"Innovation in On-line Engineering Course Delivery" LeAD 2021 Gonzaga University, Spokane, WA, January 15, 2021.

"Failure Prediction Model for Structural Glass Design" 2020 National Council of Structural Engineers Associations Webinar Series, August 18, 2020.
https://www.pathlms.com/ncsea/courses/20615/webinars/10494

"Designing with Structural Glass" 2019 Structural Engineering Association Northwest Conference, Salishan Resort, Gleneden Beach, OR, August 15-17, 2019.

"Structural Design of Glass" Structural Engineering Association of Washington: Spokane Chapter Meeting, Red Lion Hotel, Spokane, WA, February 21, 2018.

"Origami and Tensegrity Inspired Parametrics for Architectural and Structural Efficiency" Performance Network, online webinar (https://www.ibpsa.us/origami-and-tensegrity-inspired-parametrics-architectural-and-structural-efficiency) June 30, 2016.

"Graphic Statics and 3D Design" CIV 495: Structural Systems and Optimization, March 2014, Northwestern University, Evanston, IL.

"Glass and Origami Design" ARCH 597: Modern Façade Design: Natural Hazard Mitigation, Sept. 2013, Illinois Institute of Tech., Chicago, IL.

"Numerical Integration and MEMS" CEEN 6410: Numerical Analysis with Structural Applications, February 2012, Marquette University, Milwaukee, WI.

"Dynamics of SDOF Systems: Continuous Models" CEEN 6017: Dynamic Behavior of Structures, February 2012, Marquette University, Milwaukee, WI.

"Beam Theories: Bernoulli-Euler and Timoshenko" CEEN 2130: Mechanics of Materials, February 2011, Marquette University, Milwaukee, WI.

Graduate Thesis Supervised

Nabhajit Goswami, "Glass Failure Prediction for Edge Stresses," Michigan Tech. University	2020-Present
David Miklosi, "Energy Harvesting from Floor Vibrations," Milwaukee School of Engineering	2015-2016
Mahmoud Fayarouni, "Survey of Seismic Analysis Methods for Tall Buildings," Milwaukee School of Engineering	2014-2015
Aaron Huberty, "Numerical Modeling of Floors for Energy Harvesting," Milwaukee School of Engineering	2013-2014

Professional Service

Professional Affiliations (Current Italicized)

Façade Tectonics Institute (FTI)	*Member*
American Concrete Institute (ACI)	*Academic Member*
American Institute of Steel Construction (AISC)	*Professional Member*
American Society for Testing and Materials *WK37764- Structural Glass*	*Committee Member*
American Society for Testing and Materials *WKD – Dynamic Testing*	*Committee Member*
Tau Beta Pi (TBΠ) Engineering Honor Society	*Member*
American Society for Civil Engineering (ASCE)	Associate Member
Congress for New Urbanism – Wisconsin (CNU-WI)	Member
Structural Engineers Association – Wisconsin (SEA)	Member
Wisconsin Green Builder's Alliance – (WGBA)	Chair

Professional Activities – Reviewer/Committee Member

Journal Architectural Engineering American Society for Civil Engineers	2015 – Present
Engineering Structures Elsevier	2015
Mechanics Research Int'l Centre for Mechanical Sciences	2015
AEI Conference American Society for Civil Engineers	2014
Buildings and Structures Institution of Civil Engineers	2014 – 2016
Wood Education Committee Member ASCE	2013 – 2020

Academic Service

Gonzaga University Committees

Gonzaga Magazine, University Committee	2021 – Present
SEAS First Year Engineering Committee, SEAS Committee	2021 – Present
Gonzaga Patent Committee, University Committee	2021 – 2024
Center for Climate, Society, and the Environment, Board of Directors	2020 – 2023
Cataldo Project Faculty Advisory Group, University Committee	2020 – 2021
Graduate Programs Committee, University Committee	2019 – 2020
Faculty Awards Committee, University Committee	2018 – 2021
Library Committee, University Committee	2018 – 2021
SRP Search Committee	2018 – 2019
Civil Engineering ABET Committee Outcome 2 Champion	2018 – Present
Renouard Distinguished Lecture Committee	2018 – Present
SEAS Search Committee (Environmental)	2018 – 2019
SEAS Travel Committee	2017 – 2019
ISE Building Committee	2016 – 2019

Previous Committees

Graduate Programs Council, *(Milwaukee School of Engineering)*	2014 – 2016

MBA Committee, *(Milwaukee School of Engineering)*		2013 – 2016
Academic Policies and Integrity Committee, *(Marquette University)*		2011 – 2012
University Library Committee *(Marquette University)*		2010 – 2011

Academic Advising

Tau Beta Pi, Gonzaga, SEAS		2016 – Present
AISC Steel Bridge, Gonzaga, SEAS		2018 – Present

Grants

M.J. Murdock Charitable Trust "Glass Failure Studies"	$15,000	2020/2021
AISI Grant "Buckling Behavior or C- and Hat Shapes"	$6,000	2020/2021
McDonald Research Award "Wind Load Provisions Study"	$1,755	2020/2021
McDonald Research Award "Alternative Housing Options"	$1,594	2019/2020
Oldcastle "Precast Concrete Plank Shear Studies"	$15,000	2018
McDonald Award "Behavior of Cold Form Steel"	$1,763	2018/2019
Gonzaga University Research Council "GFPM Studies"	$2463	2018/2019
Gonzaga University Sponsored Research "Faculty Proposal Development Award"	$3500	2018
StructurLam "CLT Failure Prediction Studies"	$1,182	2017
KEEN "Models for Advanced Structural Analysis"	$1,370	2016
PPG Industries "3D Printing for STEM Education"	$10,000	2014-2015
Argosy Foundation "Expanding STEM Careers"	$80,000	2014-2016