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PROFESSIONAL REGISTRATION

Since 08/2010 **Professional Engineer (P.E.)** in the state of Michigan
License I.D. #: 6201057479

EDUCATION

2007 **Ph.D. in Structural Engineering,**
University at Buffalo, The State University of New York
Dissertation: Unified Control Platform for Real- Time Dynamic Hybrid Simulation

2001 **M.S. Structural Engineering**
Tongji University, Shanghai, China
Thesis: Experimental Study on Flexural Behavior of Fiber Reinforced High Performance Concrete Beams

1999 **B. S. Structural engineering**
Minor in Real Estate Economy & Management
Tongji University, Shanghai, China

ACADEMIC EXPERIENCES

08/2022-present	**Professor**
08/2014 – 07/2022	**Associate Professor**
08/2008 – 07/2014	**Assistant Professor** Department of Civil and Construction Engineering Western Michigan University
08/2007 – 07/2008	**Adjunct Assistant Professor** Department of Civil, Agricultural, Architectural and Environmental Engineering North Carolina Agricultural and Technical State University
10/2006 – 08/2007	**Postdoctoral Research Associate (Senior Development Engineer)** Structural Engineering and Earthquake Simulation Laboratory Department of Civil, Structural and Environmental Engineering University at Buffalo, The State University of New York

AWARDS / HONORS

Student Appreciation Nomination, College of Engineering and Applied Sciences, Western Michigan University (2021)

Faculty Research and Creative Activities Award, Office of Vice President for Research, Western Michigan University (2014-2015)

NSF ENHANCE Fellow, National Science Foundation funded ENHANCE program (2013)

Outstanding New Researcher Award, College of Engineering and Applied Sciences, Western Michigan University (2011)

Excellence in Civil Engineering Education (ExCEEd) Teaching Fellows, American Society of Civil Engineers (2011)

Research Development Award, Office of Vice President for Research, Western Michigan University (2008)

Civil, Structural and Environmental Engineering Graduate Fellowship*,* University at Buffalo, (2006)

Second Prize, Shanghai Construction Science & Technology Achievements Award (2001)

The People's Scholarship, Tongji University (1997-1999)

PUBLICATIONS

Referred Journal Publication

Note: Names underlined are MS and PhD students advised; Names with "+" are former advisors; all other co-authors are national and international collaborators working on funded research projects.

1. Zhou, H., **Shao, X**., Zhang, B., Tian, Y. and Wang, T., (2023) "Relative Stability Analysis for Robustness Design of Real-Time Hybrid Simulation." *Soil Dynamics and Earthquake Engineering*, 65, 107681, https://doi.org/10.1016/j.soildyn.2022.107681.

J1. Sadraddin, H. and **Shao, X.**, (2022) "State-of-the-Art of Experimental Methods for Floating Wind Turbines." *Journal of Renewable and Sustainable Energy* 14, 032701; https://doi.org/10.1063/5.0071943.

J2. Zhou, H., Zhang, B., **Shao, X**., Tian, Y., Yuan, B. and Wang, T., (2022) "Recursive Predictive Optimal Control Algorithm for Real-time Hybrid Simulation." *International Journal of Structural Stability and Dynamics*, https://doi.org/10.1142/S0219455422410115.

J3. Zhou, H., Zhang, B., **Shao, X**., Tian, Y., Guo, W., Gu, Q. and Wang, T., (2022) "Adaptive compensation method for real-time hybrid simulation of train-bridge coupling system." *Structural Engineering and Mechanics, An International Journal:*83(1), pp. 93-108. https://www.kci.go.kr/kciportal/ci/sereArticleSearch/ciSereArtiView.kci?sereArticleSearchBean.artiId=ART002859776.

J4. Yu, H., Li, Y., **Shao, X.**, Cai, X., (2021) "Virtual Hybrid Simulation Method for Underground Structures Subjected to Seismic Loadings." *Tunneling and Underground Space Technology,* **110: 103831**, https://doi.org/10.1016/j.tust.2021.103831.

J5. Alhawamdeh, B., and **Shao, X**., (2021) "Fatigue Performance of Wood Frame Roof-to-Wall Connections with Elastomeric Adhesives Under Uplift Cyclic Loading." *Engineering Structure*, **229:111605**, https://doi.org/10.1016/j.engstruct.2020.111602.

J6. Wu, J., Sadraddin, H., Ren, R., Zhang, J., and **Shao, X.**, (2021) "Invariant Signatures of Architecture, Engineering, and Construction Objects to Support BIM Interoperability between Architectural Design and Structural Analysis." *ASCE Journal of Construction Engineering and Management*, **147**(1), https://ascelibrary.org/doi/abs/10.1061/%28ASCE%29CO.1943-7862.0001943.

J7. Sadraddin, H. L., Cinar, M., **Shao, X.,** and Ahmed, M., (2020) "Testing Platform and Delay Compensation Methods for Distributed Real-time Hybrid Simulation." *Experimental Techniques*, **44**(6): 787-805, https://link.springer.com/article/10.1007/s40799-020-00390-9.

J8. Tian, Y., **Shao, X.,** Zhou, H. and Wang, T., (2020) "Advances in Real-time Hybrid Testing Technology for Shaking Table Substructure Testing." *Frontiers in Built Environment-Section of Computational Methods in Structural Engineering,* https://doi.org/10.3389/fbuil.2020.00123.

J9. Kankanmge, Y., Hu, Y., **Shao, X.,** (2020) "Application of Wavelet Transform in Structural Health Monitoring." *The Journal of Earthquake Engineering and Engineering Vibration*,**19**(2):515-532, https://doi.org/10.1007/s11803-020-0576-8.

J10. Alhawamdeh, B., and **Shao, X.,** (2020) "Uplift Capacity of Light-Frame Rafter to Top Plate Connections Applied with Construction Adhesives." *ASCE Journal of Materials in Civil Engineering*, **32** (5), https://doi.org/10.1061/(ASCE)MT.1943-5533.0003152.

J11. Zhou, H., **Shao, X.,** Wang, T., Xu, G., Li, H., Shang, Q., and Tian, Y., (2019) "Reproducing Response Spectra in Shaking Table Tests of Nonstructural Components." *Soil Dynamics and Earthquake Engineering*, **127**, https://doi.org/10.1016/j.soildyn.2019.105835.

J12. Zhou, H., Xu, D., **Shao, X.,** Ning, X., and Wang, T. (2019) "A Robust Linear-Quadratic-Gaussian Control for Real-time Hybrid Simulation on a Benchmark Problem." *Mechanical Systems and Signal Processing,* **133**, https://doi.org/10.1016/j.ymssp.2019.106260.

J13. Xu, D., Zhou, H., **Shao, X.,** and Wang, T. (2019) "Performance Study of Sliding Mode Controller with Improved Adaptive Polynomial-Based Forward Prediction." *Mechanical Systems and Signal Processing,* **133,** https://doi.org/10.1016/j.ymssp.2019.106263.

J14. Yu, J., Yan, G., Li, T. and **Shao, X.,** (2017) "Damage Localization Using Shape Change in Uniform Load Surface for Civil Large-span Space Structures." *Journal of Intelligent Material Systems and Structures,* https://doi.org/10.1177/1045389X18806388.

J15. Liu, T., Chen, Z., Yuan, Y., **Shao, X.** (2016) "Fragility Analysis for a Subway Station Structure by Incremental Dynamic Analysis." *Advances in Structural Engineering* , **20** (7): 1111-1124 doi.org/10.1177/1369433216671319.

J16. Sadraddin, H. L., **Shao, X.**, Hu, Y. (2016) "Fragility Assessment of High-Rise Reinforced Concrete Buildings Considering the Effects of Shear Wall Contributions." *The Structural Design of Tall and Special Buildings,* **25**(18):1089-1102, https://doi.org/10.1002/tal.1299.

J17. **Shao, X.**, Pang, W., Griffith, C., Ziaei, E., and van de Lindt, J.W. (2016) "Development of a Hybrid Simulation Controller for Full-Scale Experimental Investigation of Seismic Retrofits for Soft-Story Woodframe Buildings." *Earthquake Engineering and Structural Dynamics,* **45:**1233-1249, https://doi.org/10.1002/eqe.2704.

J18. Murray, J., Sasani, M., **Shao, X.,** (2015) "Hybrid Simulation of for System-Level Structural Response." *Engineering Structures,* **103:**228-238, https://doi.org/10.1016/j.engstruct.2015.09.018.

J19. **Shao, X.,** Mueller, A., and Mohammed, B. A. (2016). "Real-Time Hybrid Simulation with Online Model Updating—Methodology and Implementation.*" ASCE Journal of Engineering Mechanics*, **142**(2), 10.1061/(ASCE)EM.1943-7889.0000987.

J20. Jennings, E., Ziaei, E., Pang, W., van de Lindt, J., **Shao, X**., Bahmani, P., (2014) "Full-Scale Experimental Investigation of Second-Story Collapse Behavior in a Woodframe Building with an Over-Retrofitted First Story." *ASCE Journal of Performance of Constructed Facilities,* **30**(2), 10.1061/(ASCE)CF.1943-5509.0000736.

J21. Jennings, E., van de Lindt, J., Ziaei, E., Bahmani, P., Park, S., **Shao, X**. Pang, W., Rammer, D., Mochizuki, G., and Gershfeld, M., (2015) "Full-Scale Experimental Verification of Soft-Story-Only Retrofits Using Hybrid Testing." *Journal of Earthquake Engineering*, **19(3):** 410-430.

J22. Jennings, E., van de Lindt, J., Ziaei, E., Mochizuki, G., Pang, W., **Shao, X**. (2014). "Retrofit of a Soft-Story Woodframe Building using SMA Devices with Full-Scale Hybrid Test Verification." *Engineering Structures*, **80:**469-485.

J23. **Shao, X.**, van de Lindt, J.W., Bahmani, P., Pang, W., Ziaei, E., Symans, M., Tian, J. and Dao, T. (2014) "Real-Time Hybrid Simulation of a Multi-story Wood Shear Wall with First-Story Experimental Substructure Incorporating a Rate-Dependent Seismic Energy Dissipation Device." *Smart Structures and Systems,* **14**(6):1031-1054, https://doi.org/10.12989/sss.2014.14.6.1031.

J24. Pang, W., **Shao, X.,** van de Lindt, J., Ziaei, E., Jennings, E. (2013) "Hybrid Testing of a Soft-Story Light-Frame Wood Building with Seismic Retrofits." Wood Design Focus, **23**(4).

J25. **Shao, X.,** Griffith, C. (2013) "An Overview of Hybrid Simulation Applications in NEESR Projects." Engineering Structures.56: 1439-1451, https://doi.org/10.1016/j.engstruct.2013.07.008.

J26. Hu, Y., Dargush, G. and **Shao, X.** (2012) "A Conceptual Evolutionary Aseismic Decision Support Framework for Hospitals." *The Journal of Earthquake Engineering and Engineering Vibration.* 2012, **11**(4):499-512.

J27. **Shao**, X., Enyart, G. (2012) "Development of a Versatile Hybrid Testing System for Seismic Experimentation." Experimental Techniques. **38**(6):44-60.

J28. **Shao, X.**, [+]Reinhorn, A.M. (2012) "Development of a Controller Platform for General Force-based Real Time Hybrid Simulation." *Journal of Earthquake Engineering*, **16**(2):274-295.

J29. **Shao, X.**, [+]Reinhorn, A.M., Sivaselvan, M.V. (2011) "Real Time Hybrid Simulation Using Shake Tables and Dynamic Actuators," *ASCE-Journal of Structural Engineering*, **137**(7):748-760.

J30. Sivaselvan, M.V., [+]Reinhorn, A.M., **Shao, X.**, Weinreber, S., (2008) "Dynamic Force Control with Hydraulic Actuators Using Added Compliance and Displacement Compensation", *Earthquake Engineering & Structural Dynamics,* **37**(15):1785–1800.

J31. [+]Yuan. Y, Peng, D.C. and **Shao, X**. (2002) "Crack Analyzing of PVA Fiber Reinforced Concrete Beam." *Industrial Construction*, **32**(11) (in Chinese).

J32. [+]Yuan.Y., **Shao, X.**, (2000) "Prospect of Synthetic Fiber Reinforced Concrete", *Concrete,* **12** (134):3-7 (in Chinese).

Book Chapter

B1. **Shao, X**., Mueller, A., Griffith, C., and Enyart, G, "A Versatile Hybrid Testing System and Its Application in Developing Hybrid Simulation Methods for NEESR Projects", Chapter 9 in *Computational Methods, Seismic Protection, Hybrid Testing and Resilience in Earthquake Engineering*, Springer International Publishing Switzerland, 2015 (ISBN 9783319063935).

B2. **Shao, X**., [+]Reinhorn, A.M., "Unified Formulation for Real Time Dynamic Hybrid Testing", Chapter in *Computational Structural Engineering*, Springer, 2009 (ISBN 9789048128211), pp. 201-208.

Technical Reports

R1. AlShatnawi, M., **Shao, X.**, Sadraddin, H., (2021), "Structural Analysis Case Studies to Test the Interoperability Among Revit, Robot and STAAD", A report of the EAGER: Collaborative Research: *A Science-Based Exploration of Invariant Signatures of Architecture, Engineering, and Construction (AEC) Objects to Enable Interoperability of BIM*, Western Michigan University.

R1. Bhandary, S., and **Shao, X.,** (2019), "A Simulation-Based Investigation of Adhesive Construction to Enhance Hazard Resilience of Wood Frame Residential Building", *Report Number 18-3*, Bronco Construction Research Center, Western Michigan University.

R2. Alhawamdeh, B., and **Shao, X.**, (2018), "An Innovative Application of Construction Adhesives to Enhance Resilience of Wood Residential Building to Natural Hazards -- Part II: Monotonic and Cyclic Loading Tests on Stud-to-Sill Plate connections in Wood Shear Walls with Construction Adhesive Application", *Report Number 17-3(2)*, Bronco Construction Research Center, Western Michigan University.

R3. Alhawamdeh, B., and **Shao, X.**, (2018), "An Innovative Application of Construction Adhesives to Enhance Resilience of Wood Residential Building to Natural Hazards -- Part I: Uplift Capacity of Light-Frame Rafter to Top Plate Connections with Construction Adhesive Application", *Report Number 17-3(1)*, Bronco Construction Research Center, Western Michigan University.

R4. Nakata, N., Dyke, S., Zhang, J., Mosqueda, G., **Shao, X.**, Mahmoud, H., Head, M.H., Bletzinger, M., Marshall, G.A., Ou, G., and Song C., (2014), "Hybrid Simulation Primer and Dictionary", https://nees.org/resources/7702.

R5. Lavan, O., [+]Reinhorn, A.M., **Shao, X**. Pitman, M., (2006) "Seismic Qualification Test of Suspended Ceiling Systems - A study for Chicago Metallic Corporation", *Technical Reports UB CSEE/SEESL-*

*2006-06, 2006-08~2006-16, 2006-18 (Total **11 reports**)*. Department of Civil, Structural, and Environmental Engineering, University at Buffalo, Buffalo, New York.

R6. Pitman, M., **Shao, X.,** [+]Reinhorn, A., (2006), "Seismic Qualification of Emerson Extended Reserve Battery Enclosure", *Technical Report UB CSEE/SEESL-2006-* 01 for Emerson Engineering, Department of Civil, Structural, and Environmental Engineering, University at Buffalo, Buffalo, New York.

R7. Pitman, M., **Shao, X**., [+]Reinhorn, A.M., "Seismic qualification of Emerson single bay power backup system", *Technical Report UB CSEE/SEESL-2005-02*, Department of Civil, Structural, and Environmental Engineering, University at Buffalo, Buffalo, New York, June 2005.

R8. Kusumastuti, D., Badillo, H., **Shao, X.,** [+]Reinhorn, A.M., Whittaker, A.S., "Seismic Qualification of Suspended Ceiling Systems - A Study Performed for Armstrong Building Products Operation", *Technical Report UB CSEE/SEESL-2002-02*, Department of Civil, Structural, and Environmental Engineering, University at Buffalo, Buffalo, New York, May 2002.

Other Report by Student Advised

R9. Mueller, A., (2013) "Evaluation of Collaborative Tools for Economic Structural Seismic Simulation", A reported submitted to the NSF East-Asia Pacific Summer Institute Fellowship program.

Peer Reviewed Conference Papers

C1. Alhawamdeh, B., and **Shao, X.,** (2022) "Experimental Investigation on Lateral Behavior of Light-Frame Shear Walls Augmented with Elastomeric Adhesives." *12th National Conference on Earthquake Engineering*, Salt Lake City, Utah, June 27- July 1, 2022.

C2. Zhang, B., Zhou, H., **Shao, X**., Tian, Y., Guo, W., Wang, T., and Gu., Q. (2021) "Application of Adaptive Time Delay Compensation Combined with Linear-quadratic-gauss in Vehicle-bridge Coupling Real-time Hybrid Simulation." *17th World Conference on Earthquake Engineering* (17WCEE), Sendai, Japan, September 27-October 2, 2021.

C3. Aldegeily, M., Zhang, J., Hu, Y., and **Shao,** X. (2018) "From Architectural Design to Structural Analysis: a Data-driven Approach to Study Building Information Modeling (BIM) Interoperability." *Proc., 54th ASC Annual International Conference*, ASC, Fort Collins, CO, 537-545.

C4. Pang, W., Ziaei, E., Jennings, E., **Shao, X.,** van de Lindt, J., Gershfeld, M. and Pryor, S. (2014) "Numerical Model for Hybrid Simulation of a Three-Story Wood-Frame Building." *The 14th World Conference on Timber Engineering (WCTE),* Quebec City, Canada, August, 10-14, 2014.

C5. Gershfeld, M., Chadwell, C., Jennings, E., Ziaei, E., Pang, W., **Shao, X.** and van de Lindt, J. (2014) "Seismic Performance of Distributed Knee-Brace (DKB) System as a Retrofit for Weak-story Wood Frame Buildings,"*The 14th World Conference on Timber Engineering (WCTE),* Quebec City, Canada, August, 10-14, 2014.

C6. van de Lindt, J., Bahmani, P., Gershfeld, M., Mochizuki, G., **Shao, X.** Pryor, S., Pang, W., Symans, M., Tian, J., Ziaei, E., Jennings, E., and Rammer, D., (2014) "Seismic Risk Reduction for Soft-Story Wood-Frame Buildings: Test Results and Retrofit Recommendations from the NEES-Soft Project." *The 14th World Conference on Timber Engineering (WCTE),* Quebec City, Canada, August, 10-14, 2014.

C7. Pang, W., Ziaei, E., **Shao, X.,** E., Jennings, van de Lindt, J., Gershfeld, M. and Symans, M. (2014) "A Three-Dimension Model for Slow Hybrid Testing of Retrofits for Soft-Story Wood-Frame Buildings". *10th US National* Conference on Earthquake Engineering *(10NCEE)*, Anchorage, Alaska, July 21-25, 2014.

C8. **Shao, X**., van de Lindt, J., Bahmani, P., Pang, P., Ziaei, E., Symans, M., Tian, J., Jennings, E. and Dao, T. (2014) "Real-Time Hybrid Simulation of a Stacked Wood Shear Wall with Viscous Damper." *10th US National* Conference on Earthquake Engineering *(10NCEE)*, Anchorage, Alaska, July 21-25, 2014.

C9. Jennings, E., van de Lindt, J., **Shao, X.,** Pang, W. and Ziaei, E. (2014) "Full-Scale Hybrid Testing of a Soft-Story Woodframe Building Seismically Retrofitted using Shape Memory Alloy Devices in Scissor-Jack Braces." *10th US National* Conference on Earthquake Engineering *(10NCEE),* Anchorage, Alaska, July 21-25, 2014.

C10. van de Lindt, J., Bahmani, P., Jennings E., Pang, W., Ziaei, E., Mochizuki G., Gershfeld, M., Pryor, S., **Shao, X.,** Symans, M., Tian, J. and Rammer, D. (2014) "Full-Scale Testing of Soft-Story Woodframe Buildings using Stiffness-Based Retrofits." *10th US National* Conference on Earthquake Engineering *(10NCEE),* Anchorage, Alaska, July 21-25, 2014.

C11. van de Lindt, J., Bahmani, P., Pryor, S., Mochizuki G., Gershfeld, M., Pang, W., Ziaei, E., Jennings, E., Symans, M. **Shao, X**., Tian, J., and Rammer, D. (2014) "Overview of the NEES-Soft Experimental Program for Seismic Risk Reduction of Soft-Story Woodframe Buildings." *ASCE 2014 Structures Congress,* Boston, April, 3-5, 2014.

C12. van de Lindt, J.W., Bahmani, P., Gershfeld, M., Mochizuki, G., **Shao**, **X.,** Pang, W., Symans, M.D., Ziaei, E., Jennings, E., Pryor, S.E. Rammer, D. and Tian, J. (2013) "Full-scale Dynamic Testing of Soft-story Retrofitted and Un-retrofitted Woodframe Buildings." *Structural Engineers Association of California (SEAOC) 82nd Convention,* San Diego, California, September 18-21, 2013.

C13. van de Lindt, J.W., Bahmani, P., Gershfeld, M., **Shao**, X., Pang, W., Symans, M.D., and Mochizuki, G. (2013) "The Performance-Based Seismic Retrofit of Soft-Story Light-Frame Wood Buildings." *10th International Conference on Urban Earthquake Engineering (10th CUEE Conference),* Tokyo, Japan, March 1-2, 2013. (Paper ID 07-021).

C14. Mueller, A., Griffith, C., **Shao, X**., Enyart, G., (2013) "A Benchmark Testing System for Real Time Hybrid Simulation Development." *ASCE 2013 Structures Congress,* Pittsburgh, PA, May 2-4, 2013.

C15. Griffith, C., **Shao, X.,** van de Lindt, J.W., Bahmani, P., Pang, W., Ziaei, E., (2013) "Hybrid Simulation of a Wood Shear Wall Frame." *ASCE 2013 Structures Congress,* Pittsburgh, PA, May 2-4, 2013.

C16. van de Lindt, J.W., Symans, M.D., Pang, W., **Shao**, X., and Gershfeld, M., (2012) "The NEES-Soft Project: Seismic Risk Reduction for Soft-Story Woodframe Buildings". *15th World Conference on Earthquake Engineering,* Lisbon, Portugal, September 24-28, 2012.

C17. van de Lindt, J. W., Symans, M.D., Pang, W., **Shao, X.**, Gershfeld, M., (2012) "Seismic Risk Reduction for Soft-Story Woodframe Buildings: the NEES-SOFT project." *The 12th World Conference on Timber Engineering (WCTE),* Auckland, New Zealand, July 16-19, 2012.

C18. **Shao, X.**, Griffith, C., (2012) "Hybrid Testing in NEESR Projects." *ASCE 2012 Structures Congress,* Chicago, IL, March 29-31, 2012.

C19. **Shao,** X., (2010) "A General Force-Based Hybrid Simulation Formulation", *9th US National and 10th Canadian Conference on Earthquake Engineering*, Toronto, Canada, July 25-29, 2010.

C20. **Shao, X.,** +Reinhorn, A.M., (2007) "A Unified Formulation for Real Time Dynamic Hybrid Simulation." *9th Canadian conference on earthquake engineering*. Ottawa, Ontario, Canada, June 2007.

C21. **Shao**, **X**., + Reinhorn, A.M., (2007) "Real Time Hybrid Dynamic Simulation with Substructure Techniques." *Proceedings of ASCE 2007 Structures Congress* Long Beach, CA. May 16-19, 2007.

C22. +Reinhorn, A.M., **Shao**, X., Sivaselvan, M.V., Pitman, M., Weinreber, S. (2006) "Real Time Dynamic Hybrid Testing Using Shake Tables and Force-based Substructuring." *Proceedings of ASCE 2006 Structures Congress* St. Louis, Missouri, May 18-20, 2006.

C23. **Shao X.**, +Reinhorn A.M., Sivaselvan M.V. (2006) "Real Time Dynamic Hybrid Testing Using Force-based Substructuring." *8th US National Conference of Earthquake Engineering*, April 17-23, 2006, San Francisco.

C24. +Reinhorn, A., Sivaselvan, V., Liang, Z., **Shao, X**. (2004) "Real-time Dynamic Hybrid Testing of Structural Systems." *Proceedings of the 13th World Conference on Earthquake* Engineering (13WCEE), Vancouver, CA, August 8, 2004.

C25. +Reinhorn, A.M. Bruneau, M., Chu, S.Y., **Shao, X**. and Pitman, M.C. (2003) "Large Scale Real Time Dynamic Hybrid Testing Technique -- Shake Tables Substructure Testing." *Proceedings of ASCE 2003 Structures Congress*, Seattle WA, May, 29-June 2, 2003., Paper 587.

Other Conference Papers

C26. Sadraddin, H., and **Shao, X.,** (2022) "Virtual Distributed Real-Time Hybrid Simulation for Floating Wind Turbine Under the Coupled Wind and Wave Loads", ASCE Engineering Mechanics Institute (EMI) Conference, Baltimore, Maryland, May 31-June 3, 2022

C27. Alhawamdeh, B., and **Shao, X.,** "Fatigue Performance of Wood Frame Roof-to-Wall Connections with Elastomeric Adhesives under Uplift Cyclic Loading." *6h American Association for Wind Engineering (AAWE) Workshop* (Virtual), Clementson University, 2021.

C28. Ari-Gur, P., **Shao X.,** Sadraddin, H. and Zhang, J. (2019) "Smart Material for Seismic Damping for Variable Weather Conditions." ASME International Mechanical Engineering Congress and Exposition, paper # 11957, Las Vegas, NV, Nov. 8-14, 2019.

C29. Alhawamdeh, B., and **Shao, X.,** "Uplift Capacity of Light-Frame Rafter to Top Plate Connections Applied to Construction Adhesives." *5th American Association for Wind Engineering (AAWE) Workshop*, Miami, FL, August 12~14, 2018.

C30. Mohammed, B.A., **Shao**, X., (2017) "Implementing Online Model Updating of Complex Hysteresis Models into Real-Time Hybrid Simulation Using Constrained Unscented Kalman Filter." *3rd Huixian International Forum on Earthquake Engineering for Young Researchers* (3HIFEE), Champaign, IL, August 11~12, 2017.

C31. Al Jumaili, I., **Shao**, X., (2017) "Research on the Seismic Performance of Reinforced Concrete and Masonry Structures using Recycled Materials." *3rd Huixian International Forum on Earthquake Engineering for Young Researcher*s (3HIFEE), Champaign, IL, August 11~12, 2017.

C32. Sadraddin, H.L., **Shao**, X., (2017) "Fragility Assessment of High-Rise Reinforced Concrete Buildings Considering the Effects of Shear Wall Contributions." *3rd Huixian International Forum on Earthquake Engineering for Young Researchers* (3HIFEE), Champaign, IL, August 11~12, 2017.

C33. Ahmet, M., **Shao**, X., (2017) "Distributed Real-time Hybrid Simulation at LESS." *3rd Huixian International Forum on Earthquake Engineering for Young Researchers* (3HIFEE), Champaign, IL, August 11~12, 2017.

C34. van de Lindt, J. W., Symans, M.D., Pang, W., **Shao, X.**, Gershfeld, M., (2012) "A Comprehensive Introduction to the NEES-Soft Project: Seismic Risk Reduction for Soft-Story Woodframe Buildings." *The 9th International Conference on Urban Earthquake Engineering and the 4th Asia Conference on Earthquake Engineering,* Tokyo, Japan, March 6-8, 2012, (Oral presentation).

C35. **Shao, X.,** (2009) "Unified approach for Real Time Dynamic Hybrid Simulation using Shake Tables and Actuators." *3rd International Conference on Advances in Experimental Structural Engineering*, San Francisco CA, October 15-16, 2009.

C36. **Shao**, **X**, +Reinhorn, A.M., Sivaselvan, M.V., (2006) "Force Controlled Actuators in Hybrid Testing", *4th World Conference on Structural Control and Monitoring*, San Diego, July 11-13, 2006.

C37. +Reinhorn, A.M., Sivaselvan, M.V., Liang, Z., **Shao, X**., Pitman, M., and Weinreber, S. (2005) "Large Scale Real Time Dynamic Hybrid Testing Technique – Shake Tables Substructure Testing." *Proceedings of The First International Conference on Advances in Experimental Structural Engineering*, AESE 2005 July, Nagoya, Japan, 457.

C38. +Reinhorn, A.M., Sivaselvan M.V., Weinreber S., **Shao, X.,** (2004) "A Novel Approach to Dynamic Force Control." *Proceedings of Third European Conference on Structural Control* (3ECSC), Vienna University of Technology, Vienna, Austria, July 12-15, 2004.

C39. +Reinhorn, A.M., Sivaselvan M.V., Weinreber S., **Shao, X.,** (2004) "Real-time Dynamic Hybrid Testing of Structural Systems." *Proceedings of Third European Conference on Structural Control* (3ECSC), Vienna University of Technology, Vienna, Austria, July 12-15, 2004.

C40. [+]Yuan. Y, Peng, D.C. and **Shao, X**., (2003) "Crack Control in Reinforced Concrete using PVA Fiber." *International conference on advanced in concrete structure ICACS*, Xuzhou, China, September 17-19, 2003 (Chinese).

PRESENTATIONS

Invited Lectures and Seminars

1. "Recent Development of Real-Time Hybrid Simulation (RTHS) at LESS", November 29, 2019, *Zhejiang University*, Hangzhou, Zhejiang, China.
2. "Civil and Construction Engineering at Western Michigan University", November 28, 2019, *Shanghai Urban Construction Vocational College*, Shanghai, China.
3. "Development of Real-Time Hybrid Simulation (RTHS) at LESS", November 26, 2019, *Tongji University*, Shanghai, China.
4. "Recent Development of Real-Time Hybrid Simulation (RTHS) at LESS", November 22, 2019, *Zhejiang University of Technology*, Hangzhou, Zhejiang, China.
5. "Recent Real-Time Hybrid Simulation (RTHS) Development at LESS", July 31, 2018, *Tongji University*, Shanghai, China.
6. "Introduction to RTHS Experimental Methods, from Theory, Testing System to Implementation", July 10~13, 2018, *Institute of Engineering Mechanics, China Earthquake Administration*, Langfang, Heibei, China.
7. "Advanced Hybrid Simulation for Structural Seismic Performance Evaluation", November 2, 2017, *Institute of Engineering Mechanics, China Earthquake Administration*, Langfang, Heibei, China.
8. "Advanced Hybrid Simulation for Structural Seismic Performance Evaluation", September 1, 2015, *Zhenjiang University*, Hangzhou, Zhejiang, China.
9. "Advanced Hybrid Simulation for Structural Seismic Performance Evaluation", August 18, 2015, *Harbin Institute of Technology*, Harbin, Heilongjiang, China.
10. "Advanced Hybrid Simulation for Structural Seismic Performance Evaluation—Part I: Real-Time Hybrid Simulation & Part II: Hybrid Simulation Application", August 5, 2015, *Fuzhou University*, Fuzhou, Fujian, China.
11. "Advanced Hybrid Simulation for Structural Seismic Performance Evaluation", July 22, 2015, *Tongji University*, Shanghai, China.
12. "A Unified Approach for Real-Time Hybrid Simulation (RTHS)", May 28, 2014, *University of Connecticut*.
13. "Real-Time Hybrid Simulation: Current Applications and Future Approaches", November 11, 2013, *University of Michigan*.
14. "A Unified Approach for Real Time Hybrid Simulation", September 18, 2012, *Purdue University*.
15. "A Unified Platform for Seismic Hybrid Simulation", October 9, 2009, *University of Illinois, Urbana-Champaign*.

16. "Unified Control Platform for Laboratory Seismic Hybrid Simulation Methods", June 18, 2008, *Western Michigan University*.

Oral Presentations at Conferences/Panel Meetings/Workshops

1. "Virtual Distributed Real-Time Hybrid Simulation for Floating Wind Turbine Under the Coupled Wind and Wave Loads", ASCE Engineering Mechanics Institute (EMI) Conference, Baltimore, Maryland, May 31-June 3, 2022. (Presented by Sadraddin, H.)
2. "Fatigue Performance of Wood Frame Roo-to-Wall Connections with Elastomeric Adhesives under Uplift Cyclic Loading", 6th American Association for Wind Engineering (AAWE) Workshop (Virtual), Clemson University, May 12-14, 2021. (Presented by C27. Alhawamdeh, B.)
3. "Testing Platform and Delay Compensation Methods for Distributed Real-Time Hybrid Simulation", *Joint ETH-MECHS Workshop: New Frontiers and Innovative Methods for Hybrid Simulation,* Zurich, Swiss, March 13-15, 2019.
4. "Barriers for Hybrid Simulation Methods", *A Multi-Hazard Engineering Collaboratory on Hybrid Simulation: Breaking Barriers and Building Capacity*, La Jolla, CA, Dec. 12-13, 2017.
5. "Implementing online updating to complex hysteresis models in real-time hybrid simulation using constrained unscented Kalman filter", *3rd Huixian International Forum on Earthquake Engineering for Young Researchers,* August 11-12, University of Illinois, Urbana-Champaign, 2017. (presented by MS. Student Bilal Ahmed Mohammed).
6. "Research on seismic performance of civil structures using recycled materials", *3rd Huixian International Forum on Earthquake Engineering for Young Researchers,* August 11-12, University of Illinois, Urbana-Champaign, 2017. (presented by Ph.D student Inas Al Jumaili).
7. "Implementing online updating to complex hysteresis models in real-time hybrid simulation using constrained unscented Kalman filter", *3rd Huixian International Forum on Earthquake Engineering for Young Researchers,* August 11-12, University of Illinois, Urbana-Champaign, 2017. (presented by MS. Student Bilal Ahmed Mohammed).
8. "The effects of shear wall configuration on seismic performance of high‐rise reinforced concrete buildings", *3rd Huixian International Forum on Earthquake Engineering for Young Researchers*, August 11-12, University of Illinois, Urbana-Champaign, 2017.
9. "Large-Scale Hybrid Simulation for Structural Hazard Mitigation: Challenges and Opportunities", *Researchers Workshop: Advanced Simulation for Natural Hazards*, Lehigh University, Lehigh, PA, December 5-6, 2016.
10. "Incremental Hybrid Simulation Development Method for Large-Scale Application" *United States (US) – European Union (EU) – Asian Workshop on Real-Time Hybrid Simulation*, Ispra, Italy, October 5-6, 2015.
11. "Hybrid Simulation Implementation in NEES-Soft and NEES RC Frame Collapse Projects", *10th US National Conference on Earthquake Engineering (10NCEE),* Anchorage, Alaska, July 21-25, 2014.

12. "Real-Time Hybrid Simulation of a Stacked Wood Shear Wall Frame with Viscous Damper", *10th US National Conference on Earthquake Engineering (10NCEE),* Anchorage, Alaska, July 21-25, 2014.
13. "Real-Time Hybrid Simulation of Wood Shear Wall Frame with Viscous Damper", *ASCE 2014 Structures Congress,* Boston, MA, April 3-5, 2014.
14. "A Versatile Hybrid Testing System and its Application in Developing Hybrid Simulation Methods for NEESR Projects", *A Symposium to Honor the Career & Contributions of Andrei M. Reinhorn,* Buffalo, NY, September 20, 2013.
15. "Hybrid Simulation of a Wood Shear Wall Frame", *ASCE 2013 Structures Congress,* Pittsburgh, PA, May 2-4, 2013.
16. "Hybrid Simulation Research and Collaboration Opportunities", *3rd Workshop on China-USA Collaboration for Disaster Evolution/Resilience of Civil Infrastructure and Urban Environment*, Berkeley, California, August 13~14, 2012.
17. "Benchmark Problems and Future Development of Real-Time Hybrid Simulation", *Advances in Real-time hybrid simulation workshop*, Lehigh Network for Earthquake Engineering Simulation (NEES) facility, October 10-11, 2011.
18. "Seismic Risk Reduction for Soft-Story Woodframe Buildings: the NEES-Soft project", *2011 Quake Summit: NEES and MCEER Annual Meeting*, Buffalo, NY, June 9-11, 2011 (Jointly presented with John van de Lindt).
19. "Real time Dynamic Hybrid Simulation with Substructure Techniques", *ASCE 2007 Structures Congress,* Long Beach, CA. May 16-19, 2007.
20. "UB Concept of Distributed Testing", *NEES hybrid advisory panel meeting*, Chicago, IL, May 11, 2007.
21. "Real Time Dynamic Hybrid Simulation in Structural Engineering- Research at the UB_NEES Versatile Large-Scale Hybrid Testing Laboratory", *A users' perspective training workshop*, Buffalo, NY, September 2006.
22. "Real Time Dynamic Hybrid Testing using Force-based Substructuring", *8th US National Conference of Earthquake Engineering*, San Francisco, CA, April 2006.
23. "Large Scale Hybrid Testing at the University at Buffalo", *NEESit Hybrid Simulation Workshop*, San Diego, CA, October 2005.

Poster Presentations at Conferences

1. "Experimental Investigation on Lateral Behavior of Light-Frame Shear Walls Augmented with Elastomeric Adhesives." *12th National Conference on Earthquake Engineering*, Salt Lake City, Utah, June 27- July 1, 2022. (Presented by Alhawamdeh, B.)
2. "Real-Time Hybrid Simulation (RTHS) for Structural Seismic Response Evaluation", *WMU Spring Convocation 2021*, April, 2021 (Virtual).

3. "Geographically Distributed Hybrid Testing in Earthquake Engineering", *NSF CMMI Engineering Research and Innovation Conference & 2012 Quake Summit*, Boston, MA, July 9-12, 2012.
4. "Near Collapse Performance of Existing Reinforced Concrete Frame Buildings", *NSF CMMI Engineering Research and Innovation Conference & 2012 Quake Summit*, Boston, MA, July 9-12, 2012.
5. "NEES-Soft: Seismic Risk Reduction for Soft-story Woodframe Buildings", *NSF CMMI* Engineering *Research and Innovation Conference & 2012 Quake Summit*, Boston, MA, July 9-12, 2012.
6. "Hybrid Testing in NEESR Projects", *ASCE 2012 Structures Congress*, Chicago, IL, March 29-31, 2012.
7. "Seismic Risk Reduction for Soft-story Woodframe Buildings", *2011 Quake Summit: NEES and MCEER Annual Meeting*, Buffalo, NY, June 9-11, 2011.
8. "Development of Versatile Hybrid Testing System for Seismic Evaluation", *2011 Quake Summit: NEES and MCEER Annual Meetin*g, Buffalo, NY, June 9-11, 2011.
9. "NEESR-CR; NEES-Soft: Seismic Risk Reduction for Soft-story Woodframe Buildings", *NSF Engineering Research and Innovation Conference,* Atlanta, GA, January 4-7, 2011.
10. "Conceptual Design of NEES Hybrid Simulation Benchmark Study", *7th NEES annual meeting*, Hawaii, HI, June 22-25, 2009.

TEACHING ACTIVITIES

08/2008-Present **Western Michigan University**

Undergraduate required courses:

CCE 4400 Introduction to Structural Design

CCE 3860 Structural Analysis

Undergraduate elective courses:

CCE 5440 Design of Concrete Structures

CCE 5450 Design of Steel Structures

CCE4450 Design of Steel Structures (I)

Graduate courses:

CCE 6460 Earthquake Engineering

CCE 6060 Dynamic analysis of structures

CCE 6520 Prestressed concrete design

CCE 6020 Modeling and analysis of civil engineering application

08/2007 -07/2008 **North Carolina Agricultural and Technical State University**

Undergraduate: CAAE 102 Fundamental computer application for CAAE

CAAE 150 Freshmen fundamental review seminar

CAAE 334 Engineering mechanics (II): dynamics

CIEN 520 Geotechnical engineering (II)
CAAE 335 Structural analysis

Graduate: CIEN 735 Wind and earthquake design

STUDENT ADVISING

Ph.D. Students

1. "Enabling Distributed Real-Time Hybrid Simulation for Floating Wind Turbine Subject to Wind and Wave Loads", *dissertation committee chair* of Hezha Sadraddin, Fall 2022.
2. "Wind Uplifting Performance of Roof-to-Wall Connections and Roof Structures with Elastomeric Adhesives in Light-Frame Wood Buildings", *dissertation committee chair* of Bilal Alhawamdeh, Summer 2020.

Master Thesis Students

1. "Simulation-based Investigation of Adhesive Construction to Enhance Hazard Resilience of Woodframe Residential Building", *thesis committee chair* of Sharthak Bhandary, Spring 2020.
2. "Enabling Robust Distributed Real-time Hybrid Simulation Methods and Expand its Application in Wind Floating Turbine Structural System", *thesis committee chair* of Mehmet Cinar, Fall 2018.
3. "Implementing Online Updating to Complex Hysteresis Models in Real-Time Hybrid Simulation Using Constrained Unscented Kalman Filter", *thesis committee chair* of Bilal Ahmed Mohammed, Spring 2017.
4. "Fragility Assessment of High-Rise Reinforced Concrete Buildings", *thesis committee chair* of Hezha Sadraddin, Summer 2015.
5. "Real-Time Hybrid Simulation with Online Model Updating using Unscented Kalman Filter", *thesis committee chair* of Adam Mueller, Summer 2014.
6. "The Implementation of a Versatile Pseudodynamic Hybrid Simulation for Seismic Evaluation of Structural Systems", *thesis committee chair* of Chelsea Anne Griffith, Fall 2012.
7. "Structural Health Monitoring of a Bridge Structure Using Wireless Sensor Network", *thesis committee chair* of Chee Kian Teng, Spring 2012.
8. "Development of a Versatile Hybrid Testing System for Seismic Evaluation of Structural Systems", *thesis committee chair* of Griffin A. Enyart. Spring 2011.
9. "Investigation of Damage Detection Methods with a Wireless Sensor Network", *thesis committee chair* of Mark Joseph Humiecki. Spring 2010.

Master Project Students

10. "Incremental Dynamic Analysis of a Bridge Structural System", *master project advisor* of Yu Shan, Spring 2017.
11. "Development of Geographically Distributed Real-Time Hybrid Simulation Platform at LESS", *master project advisor* of Mohamed Ahmed, Fall 2016.

12. "Integration Algorithms in Real-Time Hybrid Simulation", *master project advisor* of Carlos Santana, Summer 2014.
13. "A Comparison Study of Earthquake Analysis Using SAP2000 and RT_Frame2D", *master project advisor* of Mohamed Rusthi Mohamed Ibralebbe, Spring 2014.
14. "Effects of Friction Damper on Seismic Response of a Steel Frame Structure – Numerical Simulation and Experimental Investigation", *master project advisor* of Christopher Sawyer, Fall 2013.
15. "Structural Design of a Steel Industrial Building & Seismic Design of a Steel Concentrically Braced Frame", *master project co-advisor* (with Dr. Yufeng Hu) of Bradley Gerbasich, Summer 2013.
16. "Real-Time Hybrid Simulation of a Three-Story Steel Frame Structure", *master project advisor* of Adnan Sanchez Rosario, Spring 2013.
17. "Incremental Dynamic Analysis of a Steel Moment Frame", *master project advisor* of Roger A. Sanchez M., Spring 2012.
18. "Pseudodynamic Testing of a Scaled Specimen using General Similitude Laws", *master project advisor* of Kevin James Phillips, Spring 2012.

Visiting Scholar

1. "Multibody System Discrete Time Transfer Matrix Method for Nonlinear Shear Dynamic Analysis of Immersed Tunnels", Zhongyuan Shen, Ph.D., Tongji University, China, October 2015~Aprial 2016.

Advised Students Awards

NSF East-Asia Pacific Summer Institute Fellowship 2013, Adam Mueller
NSF East-Asia Pacific Summer Institute Fellowship 2012, Chelsea Griffith

FUNDED RESEARCH PROJECTS

1. "A Simulation-Based Investigation of Adhesive Construction to Enhance Hazard Resilience of Woodframe Residential Buildings", **PI**, Georgeau Construction Research Institute, #18-3, 06/2018~09/2019, $49,909.
2. "EAGER: Collaborative Research: A Science-Based Exploration of Invariant Signatures of Architecture, Engineering, and Construction (AEC) Objects to Enable Interoperability of BIM", **PI** (Co-PI: P. Ari-Gur), National Science Foundation, #CMMI-1745378, 09/2017~08/2021, $111,834.
3. "An Innovative Application of Construction Adhesive to Enhance Resilience of Wood Residential Buildings to Natural Hazards", **PI**, Georgeau Construction Research Institute, #17-3, 06/2017~09/2018, $49,995.
4. "Smart Real-Time Hybrid Simulation to Advance Earthquake Engineering Experimental Methods", **PI**, Office of Research and Innovation, Western Michigan University, 07/2014~06/2015, $9,935.

5. "NEESR: Near Collapse Performance of Existing Reinforced Concrete Frame Buildings", **Co-PI** (PI: M. Sasani, Northeastern University), National Science Foundation, #CMMI-1135005, $ 539,995 (Western Michigan University: $ 82,100), 01/2012~12/2014.
6. "NEESR-CR: NEESsoft: Seismic Risk Reduction for Soft Story Woodframe Buildings", **Co-PI** (PI: J. van de Lindt, Colorado State University, Co-PIs: M. Symans, Rensselaer Polytechnic Institute; W. Pang, Clemson University, M. Gershfeld, California State Polytechnic University, Pomona; National Science Foundation, CMMI-#1041631, #1314957, $1,277,000 (Western Michigan University: $106,982-include $6000 for Research Experiences for Undergraduate Students), 10/2010~09/2013.
7. "Implementation and Execution of Hybrid Simulation Platform for Seismic Performance Evaluation of Structures through Collapse", **PI,** University at Buffalo (through a subcontract of an NSF CAREER project), $5,500, 07/2009~09/2009.
8. "A Unified Hybrid Simulation Platform for Earthquake Performance Evaluation of Civil Structures", **PI**, Office of Research and Innovation, Western Michigan University, $2,500, 05/2009 ~ 12/2010.
9. "Development of Versatile Hybrid Testing system for Seismic Evaluation of Civil Structural Systems", **PI**, Western Michigan University, $62,000, 09/2009~08/2010.

PROFESSIONAL SOCIETY AFFILIATIONS

Member, American Society of Civil Engineers (ASCE) (2008-present)
Faculty Member, American Concrete Institute (ACI) (2020-present)
Educator Member, American Institute of Steel Construction (AISC) (2009-present)
Member, Earthquake Engineering Research Institute (EERI) (2009-2011, 2013-2014)

PROFESSIONAL SERVICES

Department Service Activities

Undergraduate Faculty Advisor, September 2014 ~ present
Chair, Department scholarship committee, September 2012~present
Chair, Department curriculum committee, Fall 2010~present
Member, Department graduate committee, Fall 2019~present
Member, Department infrastructure committee, Fall 2013~ present
Advisor, ASCE Steal Bridge Team, Fall 2009~present
AAUP department representative, Fall 2010~present
Ad-hoc committee
Member, Department faculty search committee for one tenure-tracked Assistant/Associate professor in construction engineering. 2017~ 2018, 2018-2019.
Member, Department promotion/tenure and sabbatical committee, 2016~2020
Chair, Department search committee for one Office assistant, July 2010~August 2011

Chair, Department faculty search committee for one tenure-tracked Assistant professor in transportation engineering. November 2010~March 2011

Member, Department faculty search committee for one tenure-track Assistant professor in Construction engineering, June 2011~September 2011

Member, Department faculty search committee for two tenure-track Assistant professors in Construction engineering, November 2009~January 2010

College Service Activities

Member, College scholarship committee, Fall 2008 ~present

Member, College curriculum committee, Fall 2010~present

Ad-hoc committee

Member, College committee on Interdisciplinary Engineering and Applied Sciences (IEAS) Doctor of Philosophy Program, Fall 2009- Spring 2011

University Service Activities

Member, Sabbatical Committee, September 2019~May 2020

Representor of the College of Engineering and Applied Sciences at the Faculty Senate Undergraduate Studies Council (USC), September 2017~May 2020