Rui Zhang

Postdoctoral Fellows

Chair of Structural Mechanics and Monitoring, ETH Zurich

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EDUCATION

Ph.D. **Civil Engineering, Penn State University, USA** **Aug. 2019 – Aug. 2024**

Thesis: *Physics-informed Parallel Neural Networks for the Identification of Continuous Structural Systems*

Advisor: Dr. Gordon Warn and Dr. Aleksandra Radlińska

M.S. **Civil Engineering, Tongji University, China** **Sep. 2016 – Jul. 2019**

Thesis: *Identification of Structural Parameters and Damping force Based on Adaptive Kalman Filter*

Advisor: Dr. Songtao Xue and Dr. Liyu Xie

B.S. **Civil Engineering, Northwest A&F University, China** **Sep. 2008 – Jul. 2012**

Thesis: *Structure design of an irregular high-rise building with complicated plate*

EMPLOYMENT

Postdoctoral Fellows ETH Zürich, Switzerland **Dec. 2024 – Present**

Research Assistant Penn State University, USA. **Aug. 2019 – Dec. 2024**

Structural Engineer P&T Architects & Engineers Ltd, Shanghai, China **Oct. 2012 – Apr. 2016**

RESEARCH INTERESTS

Structural identification and health monitoring; Structural dynamics and control; Uncertainty Quantification; Physics-informed neural networks; Kalman filter.

PUBLICATIONS

PEER-REVIEWED JOURNAL PUBLICATIONS

1. **Zhang, R.**, Warn, G., Radlińska, A. (2024). Physics-Informed Parallel Neural Networks with Neural Tangent Kernel-based Self-weighting for Continuous Structural System Identification. *Computer Methods in Applied Mechanics and Engineering,* 427 (2024): 117042.

2. **Zhang, R.**, Warn, G., Radlińska, A. (2024). Dual state-parameter estimation of continuous structural systems with physics-informed parallel neural networks. *Journal of Sound and Vibration,* 571, 118138.

3. **Zhang, R.**, Warn, G., Radlińska, A. (2024). Assessment of Transverse Deck Cracking in Bridges during Staged Construction. *Journal of Performance of Constructed Facilities*, 38(2), 04024003.

4. **Zhang, R.**, Xue, S., Ban, X., Zhang, R., Xie, L. (2024). System Identification of a Structure Equipped with a

Cable-Bracing Inerter System using Adaptive Extended Kalman Filter. *Structural Control and Health Monitoring*, vol. 2024.

5. Li, X., **Zhang, R.**, Wan, C., Xue, S., Xie, L., Tong, Y. (2024). Additional damping force identification of passively controlled structures based on a Gillijn De Moor filter. *Measurement,* 224, 113883.

6. Li, Z., Pei, T., Ying, W., Srubar III, W., **Zhang, R.,** Yoon, J., Ye, H., Dabo, I., Radlińska, A. (2024). Can domain knowledge benefit machine learning for concrete property prediction? *Journal of the American Ceramic Society*, 107(3), 1582-1602.

7. Li, Z., Pei, T., Ying, W., Srubar III, W., **Zhang, R.,** Yoon, J., Ye, H., Dabo, I., Radlińska. A. (2023). Simulation-based transfer learning for concrete strength prediction. *In Interdisciplinary Symposium on Smart & Sustainable Infrastructures,* pp. 1114-1124. Cham: Springer Nature Switzerland.

8. **Zhang, R.**, Radlińska, A., Warn, G. (2022). Serviceability of Staged Bridges. *FHWA-PA-2021-010 PSU WO 018.* The Pennsylvania Department of Transportation, Bureau of Planning and Research Commonwealth, Harrisburg, PA.

9. Li, Z., Yoon, J., **Zhang, R.,** Rajabipour, F., Srubar III, W. V., Dabo, I., & Radlińska, A. (2022). Machine learning in concrete science: Applications, challenges, and best practices. *npj Computational Materials*, 8, 127.

10. **Zhang, R.,** Xie, L., Lu, W., Zhang F. (2020). Translocation Monitoring System for the Mahavira Hall of Jade Buddha Temple (I): Design and Implementation *(In Chinese)*. *Structural Engineers, 36.*

11. Xie, L., **Zhang, R.,** Lu, W., Zhang F. (2020). Translocation Monitoring System for the Mahavira Hall of Jade Buddha Temple (II): Analysis of Monitoring Data *(In Chinese)*. *Structural Engineers, 36.*

12. Xie, L., Li, X., **Zhang, R.,** Xue, S. (2020). Identification of a Passively-controlled Energy Dissipation Structure and Additional Damping Force Based on Adaptive Extended Kalman Filter *(In Chinese)*. *Journal of Hunan University Natural Sciences, 47.*

13. **Zhang, R.,** Xue, S., Xie, L., Zhang F., Lu, W. (2019). Structural monitoring and safety assessment during translocation of the Mahavira Hall of Jade Buddha Temple. *Sustainability, 11, 5477.*

14. **Zhang**, **R.,** Xie, L., Ban, X., Zheng, X., Xue, S. (2018). Additional Damping Force Identification of Structures Equipped with Eddy Current Inerter Dampers based on Kalman Filter. *Proceedings of the 7th Asia-Pacific Workshop on Structural Health Monitoring*, APWSHM 2018.

15. **Zhang**, **R.,** Xie, L., Xue, S., Zheng, X. (2018). Kalman filter based structural additional damping force identification for damper controlled structures *(In Chinese)*. *Building Structure, 48(S2), 441-445.*

PRESENTATIONS

ORAL PRESENTATIONS

1. **Zhang, R.**, Warn, G., Radlińska, A. (2024). Identification of creep damage in structural systems using physics-informed paralleled neural networks. *EMI/PMC,* May 28-31, Chicago, IL, US.

2. **Zhang, R.**, Warn, G., Radlińska, A. (2023). Vibration-based Damage Detection of Continuous Structural Systems using Physics-informed Neural Networks. *ACI Concrete Convention*, October 29–November 2, Boston, MA, US.

3. **Zhang, R.**, Warn, G., Radlińska, A. (2023). Dual state-parameter estimation for continuous structural systems with physics-informed paralleled neural networks. *EMI,* June 6-9, Atlanta, GA, US.

4. **Zhang, R.**, Warn, G., Radlińska, A. (2023). Vibration-based Damage Detection of Continuous Structural Systems using Physics-informed Parallel Neural Networks. *College of Engineering Research Symposium*, April 12, State College, PA, US.

5. **Zhang, R.**, Warn, G., Radlińska, A. (2023). Assessment of Transverse Cracking in Concrete Bridge Decks During Staged Construction. *102nd TRB Annual Meeting*, January 8-12, Washington, DC, US.

6. **Zhang, R.**, Warn, G., Radlińska, A. (2022). Investigation of performance of bridges during staged construction. *College of Engineering Research Symposium*, April 6, State College, PA, US.

7. **Zhang, R.**, Warn, G., Radlińska, A. (2018). Additional damping force identification of structures equipped with eddy current inerter dampers based on Kalman filter. *7th Asia-Pacific Workshop on Structural Health Monitoring,* October 11-16, Hongkong, China.

8. **Zhang, R.**, Warn, G., Radlińska, A. (2018). Kalman filter based structural additional damping force identification for damper controlled structures. 10th *China National Conference on Earthquake Engineering,* August 22-25, Shanghai, China.

9. **Zhang, R.**, Warn, G., Radlińska, A. (2018). Design and Implementation of Translation Monitoring System for the Mahavira Hall of Jade Buddha Temple. *Tongji-Tohoku Academic Forum for Post-earthquake Reconstruction and Building Strengthening Technologies,* February 21-27, Sendai, Japan.

POSTER PRESENTATIONS

10. **Zhang, R.**, Warn, G., & Radlińska, A. (2023). Vibration-based Damage Detection of Continuous Structural Systems using Physics-informed Parallel Neural Networks. *38th Graduate Exhibition*, March 24, State College, PA, US.

11. **Zhang, R.**, Warn, G., & Radlińska, A. (2022). Investigation of cracking in concrete bridge decks during staged construction. *5th Transportation Asset and Infrastructure Management Conference*, October 17-18, Boalsburg, PA, US.

12. **Zhang, R.**, Warn, G., & Radlińska, A. (2021). Deflection limits that control bridge vibrations and prevent structural damage. *College of Engineering Research Symposium*, April 14, State College, PA, US.

TEACHING EXPERIENCE

Teaching Assistant, The Pennsylvania State University

Design of Concrete Structures (Spring 2024)

Steel Design (Fall 2023, Fall 2024)

Civil Engineering Materials Laboratory (Spring 2023, Fall 2022, Spring 2022)

SERVICE AND OUTREACH ACTIVITIES

UNIVERSITY SERVICE

Member, CEE Department Diversity, Equity, and Inclusion (DEI) Student Committee, 2022–

Judge, College of Engineering Research Symposium**,** 2023

Judge, Graduate Exhibition for Research, 2023, 2022

Judge, Undergraduate Exhibition for Research, 2023, 2022

PROFESSIONAL SERVICE

Member, American Concrete Institute (ACI), 2020–

Member, ACI Committee 135 'Machine Learning-Informed Construction and Design', 2022–

Member, ACI Committee 444 'Structural Health Mentoring', 2021–

Member, American Society of Civil Engineers (ASCE), 2019–

Member, Structural Engineering Institute, 2019–

Member, Engineering Mechanics Institute, 2023–

Member, RILEM**,** *Technical Committee DCS 'Data-driven Concrete Science', 2022–*

JOURNAL REFEREE SERVICE

Mechanical Systems and Signal Processing (Elsevier)

Engineering Structures (Elsevier)

Construction and Building Materials (Elsevier)

Cement (Elsevier)

Journal of Materials in Civil Engineering (ASCE)

Journal of Performance of Constructed Facilities (ASCE)

Mathematics (MDPI)

Electronics (MDPI)

AWARDS AND HONORS

2023	**Graduate Student Convention Travel Stipend**, American Concrete Institute (ACI)
2023, 2022	**Third Place Presentation Award**, The Pennsylvania State University
2012	**Excellent Graduation Thesis**, Northwest A&F University
2011, 2009	**First-Class Scholarship**, Northwest A&F University
2010	**Third-Class Scholarship**, Northwest A&F University
2010	**Third in Province Math Competition,** Mathematical Society of Shaanxi Province