

Chao Sun
Associate Professor
Department of Civil and Environmental Engineering
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Education

Ph.D.	Civil Engineering,	Rice University,	Houston, US	2013
M.S.	Civil Engineering,	Tongji University,	Shanghai, China	2009
B.S.	Civil Engineering,	Shanghai Jiaotong University,	Shanghai, China	2006

Research Interests

- Multi-hazard Modeling and Mitigation of Critical Infrastructure;
- Coastal Infrastructure Resilience Enhancement;
- Fluid Structure Interaction between Ocean Waves and Structures;
- Vibration Based System Identification and Damage Detection;
- Energy Harvesting from Excessive Vibrations and Ocean Waves;
- Computer Vision, Data Analytics and Advanced Signal Processing;
- Complex Dynamics, Smart Sensing and Adaptive Control;
- Theoretical and Numerical Modeling of Nonlinear Vibrations.

Academic Experience

Associate Professor

Dept. of Civil & Environmental Engineering, Louisiana State University, 08/2021-present

Assistant Professor

Dept. of Civil & Environmental Engineering, Louisiana State University, 08/2015-07/2021

Postdoctoral Researcher (part time)

Dept. of Civil & Environmental Engineering, Rice University, 10/2013-07/2015

Non-academic Experience

Senior Structural Engineer

INTECSEA Inc. WorleyParsons Group 01/2014-08/2015

Teaching Experience

Louisiana State University, Baton Rouge, LA

Instructor of Structural Analysis I CE 3415 (Fall 2015, 2016, 2017, 2018, 2019, 2020)

Instructor of Principles of Reinforced Concrete CE4410 (Spring 2016, 2017, 2019, 2020, Fall 2021)

Instructor of Strength of Materials CE3400 (Fall 2016, Spring 2018)

Instructor of Structural Design for Dynamic Loads CE7430 (Fall 2016, 2018)

Instructor of Dynamics of Offshore Infrastructure CE7701 (Spring 2018, 2020)

Instructor of Bridge Design CE4460 (Spring 2021)

Honors & Awards

Louisiana Sea Grant Fellow,	2019
Outstanding Civil Engineering Educator Award, ASCE (Louisiana Branch),	2019
Louisiana State University Hurricane Resilience Research Award,	2019
Louisiana State University Faculty Summer Research Award,	2018
Louisiana State University Faculty Research Award,	2016
Rice University Civil Engineering Graduate Research Award,	2013
Best Award in the 1 st Rice University Graduate Elevator Pitch Competition	2013
Rice University Graduate Travel Grant,	2012
Rice University Research Fellowship,	2010
<i>Xinjie Scholarship</i> at Tongji University	2007/2008
Graduate with Honor , Shanghai Jiaotong University	2006
<i>Exceptional Prize</i> in <i>Structural Design Contest (First Place)</i> , Shanghai Jiaotong University	2005
<i>National Scholarship</i> in Shanghai Jiao Tong University	2005
<i>Excellent Student</i> of Shanghai Jiao Tong University (1st in the Department)	2003
Scholarship for Excellent Students in Shanghai Jiao Tong University	2003/2004/2005
1 st Prize Rank in the National High School Mathematics and Physics Competition	2001/2002

Professional Activities

Active Reviewer (reviewed more than 100 journal papers) for following journals:

- Annual Reviews in Control
- Applied Energy
- ASCE Journal of Aerospace Engineering,
- ASCE Journal of Bridge Engineering,
- ASCE Journal of Engineering Mechanics,
- ASCE Journal of Structural Engineering,
- ASCE Journal of Performance of Constructed Facilities,
- Coastal Engineering,
- Computer-aided Civil and Infrastructure Engineering,
- Earthquake Engineering and Structural Dynamics,
- Engineering Structures,
- Experimental Mechanics,
- Journal of Control Review,
- Journal of Earthquake Engineering,
- Journal of Fluids and Structures,
- Journal of Low Frequency Noise, Vibration and Active Control
- Journal of Sound and Vibration,
- Journal of Vibration and Control,
- Journal of Wind Engineering & Industrial Aerodynamics,
- Marine Structures,
- Mechanical System and Signal Processing,
- Nonlinear Dynamics,
- Ocean Engineering
- Renewable Energy
- Renewable & Sustainable Energy Reviews,

- Smart Structures and Systems,
- Smart Materials and Structures,
- Soil Dynamics and Earthquake Engineering
- Structural Control and Health Monitoring Journal,
- Structures,
- Structural Health Monitoring,
- The Structural Design of Tall and Special Buildings,
- Wind Energy,
- Wind Structures
- International Journal of Structural Stability and Dynamics

Editorial Board member of Structural control and Health Monitoring

Editorial Board member of Ocean Systems Engineering, An International Journal

Certifications & Professional Organizations

- E.I.T, Texas,
- Member of ASCE; Member of ASME.
- Member of ASCE EMI Fluid Dynamics Committee.
- Member of ASCE EMI Structural Health Monitoring & Control Committee.
- Member of ASCE EMI Dynamics Committee.
- Member of ASCE SEI Structural Sensing & Control Committee.
- Member of ASCE SEI Multi-hazard & Mitigation Committee.
- Member of ASCE SEI System Identification Committee.
- Member of ASCE SEI Performance Based Wind Engineering Committee.

Publications (* denotes corresponding author)

- **Submitted and under review:**

[40] Dynamic loads estimation of traveling vehicles via a coupled vehicle road roughness model. (In preparation)

[39] V. Jahangiri, C. Sun*, Wind Turbine Blade Bi-directional Response Control Using a Novel Nonlinear Inerter TMDs. (In preparation).

[38] V. Jahangiri, C. Sun*, A novel three-dimensional nonlinear tuned mass damper and its application for reducing vibrations of offshore floating wind turbines. (under review).

[37] D. Wang, S. Li, C. Sun*, Z Yu. A novel approach for assessment of wind-induced fragility of transmission tower under quasi-static wind, *Wind and Structures* (under review)

[36] G. Zhao, J. Xu, J. Zhou, M. Zhang, C. Sun*, Study of thermal-structural characteristics of electrified conductors under aeolian vibration, *Wind and Structures*, 2021, 33(2):155-168.

[35] Z. Zhang, C Sun*, B. Guo. Transfer-Learning Guided Bayesian Model Updating for Structural Damage Detection Accounting for Modeling Uncertainty, *Mechanical System and Signal Processing*, 166, 2022, 108426.

[34] Z. Zhang, C. Sun*, V. Jahangiri. Structural Damage Identification of Offshore Wind Turbines: a Two-step Strategy via FE Model Updating, *Structural Control and Health Monitoring* (in press).

[33] V. Jahangiri, C. Sun*, F. Kong. Study on a 3D pounding pendulum tuned mass damper for mitigating bi-directional vibration of offshore wind turbines, *Engineering Structures*, 241, 2021, 112383.

[32] C. Sun*, V. Jahangiri, H. Sun. Adaptive Bi-directional Vibration Control of Offshore Wind Turbines with

Time-varying Structural Properties, *Structural Control and Health Monitoring*, DOI: 10.1002/stc.2817.

[31] T. Ma, **C. Sun***. Large Eddy Simulation of Hurricane Boundary Layer Turbulence and Its Application for Power Transmission Systems, *Journal of Wind Engineering and Industrial Dynamics*, 2021, 210:104520.

[30] B. Zhao, **C. Sun***, Y. Zheng, Y. Cai, Effects of adjacent braces interaction on the out-of-plane flexural behavior of CHS connections, *Engineering Structures*, 2021, 231:111711.

[29] B. Zhu, **C. Sun***, V. Jahangiri, Characterizing and Mitigating Wind Ice-induced Vibration of Monopile Offshore Wind Turbines, *Ocean Engineering*, 2021, 219:108406.

• Published in 2020

[28] W. Song, **C. Sun**, Y. Zuo, V. Jahangiri, Y. Lu, Q. Han. Conceptual Study of a Real-Time Hybrid Simulation Framework for Monopile Offshore Wind Turbines under Wind and Wave Loads, *Frontiers in Built Environment* doi.org/10.3389/fbuil.2020.00129.

[27] Z. Zhang, **C. Sun***. Structural Damage Localization via Physics-Guided Machine Learning: A Methodology Integrating Pattern Recognition and Finite Element Model Updating, *Structural Health Monitoring*, DOI: 10.1177/1475921720927488.

[26] V. Jahangiri, **C. Sun***. Three Dimensional Vibration Control of Spar-type Offshore Wind Turbines Using Multiple Tuned Mass Dampers, *Ocean Engineering* 2020, 206: 107196.

[25] Z. Zhang, **C. Sun***. Multi-site Structural Damage Identification Using a Machine Learning Method of Multi-label Classification. *Measurement* 2020, 154: 107473.

[24] Z. Zhang, **C. Sun***. A Numerical Study of Multi-Site Damage Identification: A Data-Driven Method via Constrained Independent Component Analysis, *Structural Control and Health Monitoring* DOI:10.1002/stc.2583.

[23] B. Zhao, **C. Sun***, H. Li. Study on the moment-rotation behavior of eccentric rectangular hollow section cross-type connections under out-of-plane bending moment and chord stress, *Engineering Structures*, 2020, 207:110211

[22] Z. Zhang, **C. Sun***, Y. Huang. Sparse Signal Recovery for WIM Measurements from Under-sampled Data through Compressed Sensing with Highly Coherent Sensing Matrices, *Measurement*, 2020, 151: 1-18.

[21] B. Zhao, **C. Sun***, Y. Cai, C. Liu. An out-of-plane bending hysteretic model for unstiffened CHS X-connections, *Structures*, 2020, 23:335-350.

• Published in 2019

[20] Z. Zhang, **C. Sun***, C. Li, M. Sun. Vibration based bridge scour evaluation: A data-driven method using support vector machines. *Structural Monitoring and Maintenance*, 2019, 6(2): 125-145.

[19] V. Jahangiri, **C. Sun***. Integrated Bi-Directional Vibration Control and Energy Harvesting of Monopile Offshore Wind Turbines, *Ocean Engineering*, 2019, 178: 260-269.

[18] V. Jahangiri, **C. Sun***. Performance Evaluation of a 3D-PTMD in Offshore Wind Turbines under Multiple Hazards and Damage, *Smart Structures and Systems*, 2019, 24(1): 53-65.

[17] **C. Sun***, S. Nagarajaiah. Study on a Novel Adaptive Passive Stiffness Device and Its Application for Seismic Mitigation, *Journal of Sound and Vibration*, 2019, 443: 559-575

[16] **C. Sun***, V. Jahangiri. Fatigue Damage Mitigation of Offshore Wind Turbines under Real Wind and Wave Conditions, *Engineering Structures*, 2019, 178:472-483.

• Published in 2018

[15] Z. Zhang, **C. Sun***, R. Bridgelall, M. Sun. Road profile reconstruction and evaluation using connected

vehicle responses and wavelet analysis. *Journal of Terramechanics*, 2018, 80: 21-30.

[14] Z. Zhang, C. Sun*, M. Sun, R. Bridgelall. Application of a Machine Learning Method to Evaluate Road Roughness from Connected Vehicles. *Journal of Transportation Engineering, Part B: Pavements*, 2018, 144(4): 04018043.

[13] W. Xu, Y. Ma, C. Ji, C. Sun. Laboratory Measurements of Vortex-induced Vibrations of a Yawed Flexible Cylinder at Different Yaw Angles. *Ocean Engineering*, 2018, 154:27-42.

- **Published in 2017**

[12] C. Sun*, V. Jahangiri. Bi-directional Vibration Control of Offshore Wind Turbines Using a 3D Pendulum Tuned Mass Damper. *Mechanical System and Signal Processing*, 2018, 105: 338-360.

[11] C. Sun*. Mitigation of Offshore Wind Turbines under Wind-wave Load: Considering Soil Structure Interaction and Damage. *Structural Control and Health Monitoring*, 2018 25(3): 1-22.

[10] C. Sun*. Semi-active Control of Offshore Wind Turbines under Multi-Hazards. *Mechanical System and Signal Processing*, 2018, 99: 285-305.

- **Published in 2016**

[9] E. Sonmez, C. Sun, S. Nagarajaiah, B. Basu. A study on Semi-active Tuned Liquid Column Dampers (sTLCDs) for Structural Response Reduction under Random Excitations. *Journal of Sound and Vibration*, 2016(362) 1-15.

- **Published before 2015**

[8] R. P. Eason, C. Sun, A. J. Dick, S. Nagarajaiah. Steady-state response attenuation of a linear oscillator-nonlinear absorber system by using an adjustable-length pendulum in series: Experimental and numerical results. *Journal of Sound and Vibration*, 2015, 344(26): 332-344.

[7] C. Sun, S. Nagarajaiah, A. J. Dick. Experimental Investigation of Vibration Attenuation Using Nonlinear Tuned Mass Damper and Pendulum Tuned Mass Damper in Parallel. *Nonlinear Dynamics*, 2014, 78(4): 2699-2715.

[6] C. Sun, S. Nagarajaiah. Study on Semi-active Tuned Mass Damper with Variable Damping and Stiffness under Seismic Excitations. *Structural Control and Health Monitoring*: 2014, 21(6): 890-906.

[5] C. Sun, S. Nagarajaiah, A. J. Dick. Family of Smart Tuned Mass Dampers with Variable Frequency under Harmonic Excitations and Ground Motions: Closed-Form Evaluation. *Smart Structures and Systems*, 2014, 13(2): 319-341.

[4] C. Sun, R. P. Eason, S. Nagarajaiah, A. J. Dick. Hardening Duffing Oscillator Attenuation Using a Nonlinear TMD, a Semi-active TMD and Multiple TMD. *Journal of Sound and Vibration*, 2013, 332(4): 674-686.

[3] R. P. Eason, C. Sun, A. J. Dick., S. Nagarajaiah. Attenuation of a linear oscillator using nonlinear and semi-active tuned mass dampers in series. *Journal of Sound and Vibration*, 2013, 332(1): 154-166.

[2] C. Sun, X. Wu, Y. Zhou, J. Li. Numerical Simulation of Concrete Stochastic Damage Constitutive Law[J]. *Journal of Huazhong University of Science and Technology (Urban Science Edition)*, 2008, 25(4):276-279.

[1] Liu Hankun, Sun Chao, Li Jie. X-ray CT based Three Dimensional Numerical Simulation of Concrete in Mesoscopic Level. *Journal of Architecture and Civil Engineering*, 2010, 27(1):54-59.

ii) Conference papers, abstracts and presentations

[C13] V. Jahangiri, C. Sun (2019). Semi-active Vibration Control of a Spar-type Offshore Floating Wind Turbine Subjected to Wind, Wave and Current Loading. *Engineering Mechanics Institute Conferences*, CalTech, Pasadena, California, June 18-21, 2019.

- [C12] Z. Zhang, C. Sun (2019). Multi-Site Structural Damage Identification using Constrained Independent Component Analysis and Pattern Recognition. *Engineering Mechanics Institute Conferences*, CalTech, Pasadena, California, June 18-21, 2019.
- [C11] T. Correa, J. Gong, A. Kennedy, J. Womble, C. Cai, J. Cleary, T. Dao, F. Leite, D. Liang, K. Peterman, C. Sun, A. Taflanidis, R. Wood. Performance of Low-Rise Construction under Wind and Coastal Hazards during the Landfall of Hurricane Harvey. Forging Forensic Frontiers, ASCE Forensic Engineering 8th Congress, Austin, Texas, Nov, 2018. (*Note: author names are listed alphabetically in terms of last name*)
- [C10] C. Sun, V. Jahangiri, H. Sun, Bi-directional response mitigation of offshore wind turbines under multiple hazards, 7th World conference on Structural Control and Monitoring, 2018, Qingdao, China.
- [C9] C. Sun, V. Jahangiri. Response mitigation of offshore wind turbines under multiple hazards, Engineering Mechanics Institute Conference, 2018, MIT, Boston, Massachusetts.
- [C8] Z. Zhang, C. Sun. A data-driven method for damage identification using a data augmentation technique, Engineering Mechanics Institute Conference, 2018, MIT, Boston, Massachusetts.
- [C7] C. Sun, V. Jahangiri, Integrated Vibration Control and Energy Harvesting of Offshore Wind Turbines Subjected to Misaligned Wind and Wave Loading, Structures Congress, 2018, Fort Worth, Texas, USA.
- [C6] C. Sun, V. Jahangiri. Semi-active Control of offshore wind turbines under multiple hazards, Engineering Mechanics Institute Conference, 2017, San Diego, CA.
- [C5] C. Sun, V. Jahangiri, Mitigation of mono-pile offshore wind turbines under wind and wave loading, Americas Conference on Wind Engineering 2017, Gainesville, Florida, USA.
- [C4] C. Sun. Dynamics modeling and control of offshore wind turbines under misaligned wind and wave loading”, Engineering Mechanics Institute Conference, 2016, Nashville, TN, USA.
- [C3] C. Sun. Complex dynamics of offshore wind turbines under wind and wave loading”, BOEM Workshop on Offshore Wind Turbines, 2016, DC, USA.
- [C2] C. Sun, S. Nagarajaiah. STFT Based Real-time Control with Variable Stiffness and Damping of Smart Tuned Mass Damper for Seismic Protection. [C]. 15th World Conference on Earthquake Engineering, Lisbon, Portugal.
- [C1] R. P. Eason, C. Sun, A. J. Dick., S. Nagarajaiah. Using a Semi-Active Tuned Mass Damper to Limit the Motion of a Nonlinear Absorber and Attenuate Structural Vibrations. 2012 IMECE, ASME 2012 Congress.

iii) Technical Report

- [4] C. Sun, Z. Zhang. A Data-driven Framework for Damage Diagnosis of Coastal Bridges. Technical Report submitted to Louisiana Transportation Research Center, June, 2017.

[3] **C. Sun**, V. Jahangiri. Modelling of a Novel Three Dimensional Pendulum Tuned Mass Damper for the Mitigation of Offshore Wind Turbines. Technical Report submitted to Louisiana State University Faculty Research Grant, January, 2018.

[2] **C. Sun**, V. Jahangiri. Three Dimensional Vibration Control of Floating Offshore Wind Turbines. Technical Report submitted to Louisiana State University Summer Stipend Program, November, 2018.

[1] **C. Sun**, V. Jahangiri. Integrated Vibration Mitigation and Energy Harvesting of Offshore Wind Turbines. Technical Report submitted to Louisiana College of Engineering FIER Program, January, 2019.

vi) Invited Talks

[5] **C. Sun**, Complex dynamics modeling and vibration control of offshore wind turbines, December, 2019, Hunan University, Changsha, China.

[4] **C. Sun**, Three dimensional vibration mitigation of floating offshore wind turbines under wind-wave loading, December, 2019, Tongji University, Shanghai, China.

[3] **C. Sun**, Nonlinear dynamics and vibration control using STMD and NTMD, May, 2018, Tongji University, Shanghai, China.

[2] **C. Sun**, Semi-active vibration control of monopile offshore wind turbines under multi-hazards, July, 2018, Tianjin University, Tianjin, China.

[1] **C. Sun**, Analysis and vibration control of offshore structures, January, 2015, Louisiana State University, Baton Rouge, LA, USA.