Dr. Chizhi Zhang

Associate Professor of Digital Engineering
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Profile Summary

Dr. Chizhi Zhang is an Associate Professor of Digital Engineering at the Advanced Computing and Digital Technology Research Centre, Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences. Dr. Zhang specializes in digital transformation in engineering, AI-driven engineering simulations, and digital twin technologies. His research significantly enhances data analytics and operational efficiency across engineering disciplines. He is noted for developing innovative AI algorithms that optimize simulation accuracy and efficiency. Additionally, he contributes to the field with digital twins that model and predict system performance in real time, providing critical insights during testing and operational phases. Dr. Zhang has been recognized with the prestigious Hundred Talents Program award for his contributions to scientific research.

Education

- **Ph.D in Computer-Aided Engineering**, University of Greenwich, UK, 2014.12 - 2019.06
- **M.Sc in Engineering**, University of Bradford, UK, 2013.09 - 2014.12
- **B.Eng in Civil Engineering**, Chongqing University, China, 2008.09 - 2013.06

Research Interests

My expertise spans Digital Technology, Software Development, Artificial Intelligence, and Digital Twin technologies. My specific research interests include:

- **Digital Transformation in Engineering**: Leading initiatives integrating digital tools to enhance data analytics and operational efficiency, focusing on transforming engineering practices through cutting-edge technologies.
- **Artificial Intelligence for Engineering Simulations**: Specializing in developing AI-driven algorithms to optimize and automate engineering simulations, enhancing accuracy and reducing time requirements.
- **Digital Twins**: Involving in creating innovative virtual models that predict behaviors and enhance system performances through real-time data, crucial for simulating and anticipating real-world conditions.
- **Software Development for Simulation and Modeling**: Enhancing engineering software to support AI integration and digital twin functionalities, ensuring robust and versatile simulation tools for engineers across disciplines.
- **Fluid-Structure Interaction (FSI)**: Research on the interactions between fluids and structures under varying multiphysics conditions is essential for comprehending Fluid-Structure-Thermal interactions in optical applications.

Experience

Associate Professor of Digital Engineering, (2023 — present)

Advanced Computing and Digital Technology Research Centre (CDTC), Changchun Institute of Optics, Fine Mechanics and Physics (CIOMP), Chinese Academy of Sciences (CAS)

- Implementing digital tools to enhance engineering practices, developing AI for simulations, and innovating in digital twins technology.

Lecturer (Mar 2023 — Dec 2023)
Postdoctoral Researcher (Mar 2020 — Mar 2023)

University of Hull, UK

- Project: A New Partnership in Offshore Wind (EP/R004900/1 £:3,921,689)
- Research: Developed VOX-FE software for wind turbine blade analysis.
- Modules: Mathematics and Fluid Mechanics for Mechanical Engineers (Module Number: 500665) and Programming and Control modules (Module Number: 441059)

Research Fellow (Sep 2019 — Apr 2020)

University of Cambridge, UK

- Project: Investigated using acoustic waves in microfluidic devices to separate circulating tumor cells.

Awards and Honors

Hundred Talents Program, Chinese Academy of Sciences, 2023

It is awarded to outstanding scholars with significant scientific research potential.

Professional Memberships & Certifications

Professional Affiliations

- Associate Fellow, Higher Education Academy (AFHEA), 2023

Certifications

- **Data Science**, HyperionDev, BootCamp, 2023
- **Machine Learning Certification**, Stanford University via Coursera, 2019
- **Python Programming for Everybody Certification**, University of Michigan via Coursera, 2019
- **Python Data Structures Certification**, University of Michigan via Coursera, 2019
- **Structuring Machine Learning Projects Certification**, deeplearning.ai via Coursera, 2019

Skills

- Proficient in FSI/CFD/FEA software: Ansys, Abaqus, COMSOL, OpenFoam
- Skilled in programming: MATLAB, Python, LaTeX, C
- Languages: Fluent in Chinese and English; elementary proficiency in Japanese

Publications

Journal Papers

1. **C. Zhang**, H.P. Chen, K.F. Tee and D. Liang, "Reliability-based lifetime fatigue damage assessment of offshore composite wind turbine blades", *Journal of Aerospace Engineering, ASCE*, 2021, vol.34, no.3, pp. 04021019. (Editor's Choice Collection) (Impact Factor (IF) 2.242)

2. **C. Zhang**, H.-P. Chen, and T.-L. Huang, "Fatigue damage assessment of wind turbine composite blades using corrected blade element momentum theory", in *Measurement: Journal of the International Measurement Confederation*, 2018, vol. 129, no. 2018, pp. 102–111. (Impact Factor (IF) 5.131)

3. H.-P. Chen, **C. Zhang**, and T.-L. Huang, "Stochastic modelling fatigue crack evolution and optimum maintenance strategy for composite blades of wind turbines", *Structural Engineering and Mechanics*, vol. 6, no. 63, pp. 703–712, 2017. (Impact Factor (IF) 2.998)

Presentations

Conference Papers

1. **C. Zhang**, J. Dong, and D. Liang, "Numerical study of the acoustophoretic separation of circulating tumor cells," in *ICHD 2024 - 15th International Conference on Hydrodynamics Proceedings*, Rome, Italy, 2024.

2. Z. Wen, J. Zhou, J. Dong, and **C. Zhang**, "Improvement Measures for Structure System Conversions Caused by Utilizing SPMTs to Lift Trusses," in *ICCE2021 - The 8th International Conference on Civil Engineering*, Nanchang, China, 2021.

3. **C. Zhang**, H.-P. Chen, and T.-L. Huang, "Probabilistic deterioration modelling of fatigue cracking in wind turbine blades," in *SHMII 2019 - 9th International Conference on Structural Health Monitoring of Intelligent Infrastructure Proceedings*, St. Louis, USA, 2019.

4. **C. Zhang** and K. F. Tee, "Application of gamma process and maintenance cost for fatigue damage of wind turbine blade," *Energy Procedia*, vol. 158, pp. 3729–3734, 2018.

5. **C. Zhang** and H.-P. Chen, "Aerodynamic performance and fatigue damage assessment of wind turbine composite blades using corrected BEM method," in *SHMII 2017 - 8th International Conference on Structural Health Monitoring of Intelligent Infrastructure Proceedings*, Brisbane, Australia, pp. 1357–1371, 2017.

6. **C. Zhang** and H.-P. Chen, "Stochastic damage modelling of mixed-mode fatigue delamination of composite wind turbine blades," in *ICCM International Conferences on Composite Materials*, vol. 2017–August, p. 2945, Xi'an, China, 2017.

7. **C. Zhang** and H.-P. Chen, "Fatigue damage model of wind turbine composite blades under uncertain wind speed," in *Proceedings of the 2nd International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP 2017)*, Rhodes Island, Greece, 2017, pp. 616–626.

8. **C. Zhang** and H.-P. Chen, "Aerodynamic performance assessment of wind turbine composite blades using corrected blade element momentum method," in *The 2017 World Congress on Advances in Structural Engineering and Mechanics (ASEM17)*, Ilsan (Seoul), Korea, 2017.

9. **C. Zhang** and H.-P. Chen, "Optimum maintenance strategy for fatigue damaged composite blades of offshore wind turbines using stochastic modelling," in *2016 World Congress on The Structures Congress (Structures16)*, Jeju Island, Korea, 2016, p. 575.

10. **C. Zhang** and H.-P. Chen, "Monitoring based fatigue damage prognosis of wind turbine composite blades under uncertain wind loads," in *The 6th workshop on Civil Structural Health monitoring (CSHM-6)*, Belfast, UK, 2016.

11. **C. Zhang** and H.-P. Chen, "Stochastic modelling of fatigue crack evolutions in composite blades of offshore wind turbines," in *Mechanics of Structures and Materials: Advancements and Challenges - Proceedings of the 24th Australasian Conference on the Mechanics of Structures and Materials (ACMSM24)*, Curtin University, Perth, Australia, 2016, pp. 1223–1228.

12. **C. Zhang** and H.-P. Chen, "A stochastic model for damage evolution of mode II delamination fatigue of composite wind turbine blades," in *Life-Cycle of Engineering Systems*, Delft, Netherlands, 2016, pp. 1975–1982.

13. **C. Zhang**, H.-P. Chen, and T.-L. Huang, "Stochastic modelling of lifecycle delamination damage: Evolution of composite blades of wind turbines," in *Transforming the Future of Infrastructure through Smarter Information - Proceedings of the International Conference on Smart Infrastructure and Construction (ICSIC 2016)*, Cambridge, UK, 2016, pp. 603–608.

Reports

1. **C. Zhang**, T. Choudhary, and M. J. Fagan, "Structural performance and fatigue damage assessment for wind turbine blades based on the FSI model," in *Supergen ORE Hub Third Annual Assembly*, Plymouth, UK, 2021.

2. H.-P. Chen and **C. Zhang**, "Fatigue performance assessment and life cycle management of wind turbine blades," Suzhou, China, 2021.

References

Referee 1: Professor Jian Jiang
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