Jie Chen

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Google Scholar Page

EDUCATION

2018.8 - 2022.3	**Ph.D. in Mechanical Engineering** Arizona State University (ASU), Tempe, AZ, USA Thesis: Uncertainty quantification and prognostics using Bayesian statistics and machine learning Advisor: Professor Yongming Liu
2015.9 - 2018.3	**M.S. in Civil Engineering** Beihang University, Beijing, China Thesis: Experimental study on fatigue performance of corroded steel reinforcement Advisor: Professors Bo Diao and Jingjing He
2011.9 - 2015.6	**B.S. in Civil Engineering** Beihang University, Beijing, China Thesis: Degradation law of carrying capacity of bending reinforced concrete section with fatigue damage Advisor: Professor Bo Diao

PROFESSIONAL EXPERIENCE

2024.8 –	**Virginia Tech (VT)**	**Assistant Professor**
2022.4 – 2024.7	**Northwestern University (NU)**	**Postdoctoral Fellow** Advisor: Professor Wei Chen
2023.1 - 2023.3	**Northwestern University**	**Assistant Instructor**
2018.8 - 2022.3	**Arizona State University**	**Research Assistant**
2018.3 - 2018.7	**China Academy of Engineering Physics**	**Visiting Scholar**

HONORS AND AWARDS

2024.3	Ryan Fellows Best Paper Prize, NU
2023.10	Travel award for the Future Faculty Symposium at Society of Engineering Science Conference
2023.8	Third Prize in the Data Hackathon on "Automating Material Selection for Product Design" at ASME IDETC-CIE Conference
2023.3	NSF travel award for REMADE Conference
2023.2	Wiley Top Downloaded & Top Cited Article 2021-2022 (Publication [13])
2022.2	AIAA SciTech 2022 Aerospace Design & Structures Student Paper Competition Semi-finalist
2021.11	Dean's Dissertation Award in the Ira A. Fulton Schools of Engineering, ASU
2019.9	PHM Doctoral Symposium participant (One of 10 selected PhD students)
2018.3	Beijing Excellent Graduate (Top 5 out of 88, Ranking 1), Beihang University

2018.3	Best Thesis of Beihang University (Top 3 out of 88)
2016.11	Graduate Scholarship Award (Top 4 out of 21)
2016 & 2014	Merit Student of Beihang University
2014.9	Scholarship for Academic Excellence

JOURNAL PUBLICATIONS

Accepted/Published Journal Articles

1. Zhang, H., Lai, T., **Chen, J.**, Manthiram, A., Rondinelli, J. M., & Chen, W. (2024). Learning Molecular Mixture Property Using Chemistry-Aware Graph Neural Network. PRX Energy, 3(2), 023006.
2. Karkaria, V., Goeckner, A., Zha, R., **Chen, J.**, Zhang, J., Zhu, Q., ... & Chen, W. (2024). Towards a digital twin framework in additive manufacturing: Machine learning and bayesian optimization for time series process optimization. Journal of Manufacturing Systems.
3. Balamurugan, R., **Chen, J.**, Meng, C., & Liu, Y. (2024). Data-driven approaches for fatigue prediction of Ti-6Al-4V parts fabricated by laser powder bed fusion. International Journal of Fatigue, 108167.
4. **Chen, J.**, Zhang, H., Wahl, C. B., Liu, W., Mirkin, C. A., Dravid, V. P., Apley, D. W., & Chen, W. (2023). Automated crystal symmetry identification from diffraction patterns using machine learning under uncertainty. Proceedings of the National Academy of Sciences, 120 (46) e2309240120.
5. Karkaria, V., **Chen, J.**, Siuta, C., Lim, D., Radelescu, R., & Chen, W. (2023). A Machine Learning based tire life prediction framework for increasing life of commercial vehicle tires. Journal of Mechanical Design, 1-21.
6. Wahl, C. B., **Chen, J.**, Zhang, H., Liu, W., Zhang, S., Wu, J., Mirkin, C. A., Dravid, V. P., Apley, D. W. & Chen, W. (2023). Automated Crystal System Identification from Four-dimensional Scanning Transmission Electron Microscopy Data Using Brain-inspired Artificial Intelligence. Microscopy and Microanalysis. 29, Supplement_1.
7. Kethamukkala, K., Meng, C., **Chen, J.**, & Liu, Y. (2023). Crack Growth-based Life Prediction for Additively Manufactured Metallic Materials considering Surface Roughness. International Journal of Fatigue, 107914.
8. **Chen, J.**, & Liu, Y. (2023). Neural optimization machine: a neural network approach for optimization and its application in additive manufacturing with physics-guided learning. Philosophical Transactions of the Royal Society A, 381(2260), 20220405.
9. Ghumman, U. F., Chen, Q., D'Angelo, V. E., Clark, M., **Chen, J.**, Shull, K. R., & Chen, W. (2023). Crack Surface Analysis of Elastomers Using Transfer Learning. ACS Applied Materials & Interfaces, 15(11), 14901-14913.
10. **Chen, J.**, Meng, C., Gao, Y., & Liu, Y. (2022). Multi-fidelity neural optimization machine for Digital Twins. Structural and Multidisciplinary Optimization, 65(12), 340.
11. **Chen, J.**, Yu, Y., & Liu, Y. (2022). Physics-guided mixture density networks for uncertainty quantification. Reliability Engineering & System Safety, 228, 108823.
12. **Chen, J.**, Gao, Y., & Liu, Y. (2022). Multi-fidelity data aggregation using convolutional neural networks. Computer Methods in Applied Mechanics and Engineering, 391, 114490.
13. **Chen, J.**, & Liu, Y. (2022). Fatigue modeling using neural networks: A comprehensive review. Fatigue & Fracture of Engineering Materials & Structures, 45(4), 945-979.

14. Tien, S. C., Wei, H., **Chen, J.**, & Liu, Y. (2022). Energy‐based time derivative damage accumulation model under uniaxial and multiaxial random loadings. Fatigue & Fracture of Engineering Materials & Structures, 45(1), 159-173.
15. Shivankar, S., **Chen, J.**, & Liu, Y. (2022). Subcycle fatigue crack growth and equivalent initial flaw size model for fatigue life assessment under arbitrary loadings for Al-7075. International Journal of Fatigue, 156, 106685.
16. **Chen, J.**, & Liu, Y. (2021). Fatigue property prediction of additively manufactured Ti-6Al-4V using probabilistic physics-guided learning. Additive Manufacturing, 39, 101876.
17. **Chen, J.**, & Liu, Y. (2021). Probabilistic physics-guided machine learning for fatigue data analysis. Expert Systems with Applications, 168, 114316.
18. Sharma, A., **Chen, J.**, Diewald, E., Imanian, A., Beuth, J., & Liu, Y. (2022). Data-driven sensitivity analysis for static mechanical properties of additively manufactured Ti–6Al–4V. ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part b: Mechanical Engineering, 8(1), 011108.
19. Dai, R., Chandrasekaran, G., **Chen, J.**, Jackson, C., Liu, Y., Nian, Q., & Kwon, B. (2021). Thermal conductivity of metal coated polymer foam: Integrated experimental and modeling study. International Journal of Thermal Sciences, 169, 107045.
20. Wang, W., **Chen, J.**, Diao, B., Guan, X., He, J., & Huang, M. (2021). Bayesian Fatigue Life Prediction of Corroded Steel Reinforcing Bars. Advances in Civil Engineering, 2021, 1-15.
21. **Chen, J.**, Ersoy, D., & Liu, Y. (2020). Probabilistic bulk property estimation using multimodality surface non-destructive measurements for vintage pipes. Structural Safety, 87, 101995.
22. **Chen, J.**, Imanian, A., Wei, H., Iyyer, N., & Liu, Y. (2020). Piecewise stochastic rainflow counting for probabilistic linear and nonlinear damage accumulation considering loading and material uncertainties. International Journal of Fatigue, 140, 105842.
23. **Chen, J.**, Liu, S., Zhang, W., & Liu, Y. (2020). Uncertainty quantification of fatigue SN curves with sparse data using hierarchical Bayesian data augmentation. International Journal of Fatigue, 134, 105511.
24. He, J., **Chen, J.**, & Guan, X. (2020). Lifetime distribution selection for complete and censored multi-level testing data and its influence on probability of failure estimates. Structural and Multidisciplinary Optimization, 62, 1-17.
25. Wei, H., Carrion, P., **Chen, J.**, Imanian, A., Shamsaei, N., Iyyer, N., & Liu, Y. (2020). Multiaxial high-cycle fatigue life prediction under random spectrum loadings. International Journal of Fatigue, 134, 105462.
26. **Chen, J.**, Diao, B., He, J., Pang, S., & Guan, X. (2018). Equivalent surface defect model for fatigue life prediction of steel reinforcing bars with pitting corrosion. International Journal of Fatigue, 110, 153-161.

Under Review/ In Preparation Journal Articles

27. **Chen, J.**, Ou, P., Chang, Y., Zhang, H., Li, X., Sargent, E. H., & Chen, W. (2024). Adaptive Catalyst Discovery Using Multicriteria Bayesian Optimization with Representation Learning (Under review).
28. Dolar, T., **Chen, J.**, & Chen, W. (2024) Uncertainty Quantification Driven Machine Learning for Improving Model Accuracy in Imbalanced Regression Tasks. Expert Systems With

Applications (under review).

CONFERENCE PROCEEDINGS AND PRESENTATIONS

1. **Chen, J.**, Zhang, H., Wahl, C. B., Liu, W., Mirkin, C., Dravid, V., ... & Chen, W. (2024). Automated Crystal System Identification from Electron Diffraction Patterns using Multiview Opinion Fusion Machine Learning. In Midwest Microscopy and Microanalysis Society Spring Meeting "Frontiers in AI-ML and computationally-mediated microscopy". (Invited Speaker)
2. **Chen, J.**, Zhang, H., Wahl, C. B., Liu, W., Mirkin, C., Dravid, V., ... & Chen, W. (2023, November). Automated Diffraction Pattern Analysis for Identifying Crystal Systems Using Multiview Opinion Fusion Machine Learning. In AI for Accelerated Materials Design-NeurIPS 2023 Workshop.
3. **Chen, J.**, Liu, Y., & Chen, W. (2023) Neural Optimization Machine for Design with Neural Network Based Objectives. In International Design Engineering Technical Conferences & Computers and Information in Engineering Conference.
4. **Chen, J.**, & Liu, Y. (2023) Probabilistic Fatigue Data Analysis using Physics-guided Mixture Density Networks" ASME Aerospace Structures, Structural Dynamics, and Materials Conference.
5. **Chen, J.**, Meng, C., Gao, Y., & Liu, Y. (2023). Multi-Fidelity Data Aggregation for Information Fusion in Simulation and Experiment. In AIAA SCITECH 2023 Forum.
6. **Chen, J.**, Shivankar, S., & Liu, Y. Fatigue Life prediction under Arbitrary Loadings using Subcycle Fatigue Crack Growth and Equivalent Initial Flaw Size Model. In ICMFF13, 2022.
7. **Chen, J.**, Gao, Y., & Liu, Y. (2022). Convolutional neural networks for multi-fidelity data aggregation. In AIAA SCITECH 2022 Forum (p. 2144).
8. **Chen, J.**, Meng, C., & Liu, Y. (2021, November). Imaging-based fatigue mechanism investigation of additively manufactured TI-6AL-4V. In ASME International Mechanical Engineering Congress and Exposition (Vol. 85574, p. V003T03A009). American Society of Mechanical Engineers.
9. **Chen, J.**, & Liu, Y. (2021). Probabilistic Physics-guided Neural Network for Fatigue Analysis of Additively Manufactured Ti-6Al-4V. In Engineering Mechanics Institute Conference 2021 and Probabilistic Mechanics & Reliability Conference 2021.
10. **Chen, J.**, & Liu, Y. (2021). A new framework for fatigue life prediction under random loading conditions. In AIAA Scitech 2021 Forum (p. 1352).
11. **Chen, J.**, & Liu, Y. (2021). Physics-guided machine learning for multi-factor fatigue analysis and uncertainty quantification. In AIAA Scitech 2021 Forum (p. 1242).
12. **Chen, J.**, & Liu, Y. (2020, November). Bayesian information fusion of multmodality nondestructive measurements for probabilistic mechanical property estimation. In ASME International Mechanical Engineering Congress and Exposition (Vol. 84669, p. V014T14A006). American Society of Mechanical Engineers.
13. **Chen, J.**, & Liu, Y. (2020). Uncertainty quantification of fatigue properties with sparse data using hierarchical Bayesian model. In AIAA Scitech 2020 Forum (p. 0680).
14. **Chen, J.**, & Liu, Y. (2020). Multimodality data fusion for probabilistic strength estimation of aging materials using Bayesian networks. In AIAA Scitech 2020 Forum (p. 1653).
15. **Chen, J.**, & Liu, Y. (2019, September). Multimodality information fusion for aging pipe strength and toughness estimation using Bayesian networks. In 11th Annual Conference of the

Prognostics and Health Management Society, PHM 2019. Prognostics and Health Management Society.

16. **Chen, J.**, & Liu, Y. (2019, September). Probabilistic aging pipe strength estimation using multimodality information fusion. In Annual Conference of the PHM Society (Vol. 11, No. 1).
17. Wei, H., **Chen, J.**, Carrion, P., Imanian, A., Shamsaei, N., Iyyer, N., & Liu, Y. (2019). Multiaxial high-cycle fatigue modelling for random loading. In MATEC Web of Conferences (Vol. 300, p. 12005). EDP Sciences.

POSTERS

1. Crack-surface Analysis of Elastomers Using Transfer Learning, Annual Meeting of Center for Hierarchical Materials Design, Chicago, IL, 2022
2. Multimodality Information Fusion for Aging Pipe Strength and Toughness Estimation Using Bayesian Networks, Annual Conference of the Prognostics and Health Management Society, Scottsdale, AZ, 2019

PROFESSIONAL ACTIVITIES AND SERVICE

Professional Society Memberships

1. American Institute of Aeronautics and Astronautics (AIAA) Non-Deterministic Approaches Technical Committee
2. AIAA Young Professional Group
3. The American Society of Mechanical Engineers (ASME)

Paper Reviewing

Journals

1. Engineering Applications of Artificial Intelligence
2. Fatigue & Fracture of Engineering Materials & Structures
3. International Journal of Fatigue
4. International Journal of Mechatronics and Manufacturing Systems
5. Journal of Bridge Engineering
6. Journal of Computing and Information Science in Engineering
7. Journal of Materials Processing Technology
8. Journal of Manufacturing Processes
9. Journal of Mechanical Design
10. Journal of the Royal Statistical Society: Series C
11. Journal of Zhejiang University-SCIENCE A
12. Materials Today Communications
13. Mathematical Biosciences and Engineering
14. Multidiscipline Modeling in Materials and Structures
15. Nature Communications
16. Reliability Engineering & System Safety

Conferences

1. ASME IDETC Conference
2. ASME IMECE Conference

3. ASME Turbo Expo Conference

MENTORING ACTIVITIES

Postdoc/Student Mentor

Industry

1. Dr. Dong Hyun Ha, Hyundai Motor Company, 2022 – 2023

Ph.D. students

2. Gourav Kumbhojkar, Mechanical Engineering, NU, 2024 – present
3. Tuba Dolar, Mechanical Engineering, NU, 2023 – present
4. Vispi Karkaria, Mechanical Engineering, NU, 2022 – present
5. Umar Farooq Ghumman, Mechanical Engineering, NU, 2022

Research assistant

6. Zhuoxin (Joy) Sun, Mechanical Engineering, NU, 2023

Master students

7. Julian Delgado, Mechanical Engineering, NU, 2023 – present
8. Vinamra Saxena, Mechanical Engineering, NU, 2022 – present
9. Shih-Chuan Tien, Mechanical Engineering, ASU, 2019 – 2021
10. Sushant Shivankar, Mechanical Engineering, ASU, 2019 – 2021
11. Antriksh Sharma, Mechanical Engineering, ASU, 2019 – 2021

Undergraduate students

12. Cesar Fuentes, Computer Engineering, University of Illinois Chicago, 2023 – present
13. Genmao Zhunag, Mechanical Engineering, NU, 2023
14. Michael Clark, Mechanical Engineering, NU, 2022
15. Luke Hase, Mechanical Engineering, ASU, 2021 – 2022
16. Newton Tam, Mechanical Engineering, ASU, 2021 – 2022

TEACHING ACTIVITIES

Certificate

Center for the Integration of Research, Teaching and Learning (CIRTL) Associate, NU, 2023

Assistant Instructor

1. ME 341 Computational Methods for Engineering Design (prepared slides, homework, quiz, and projects, grade, and gave lectures), NU, 2023
2. Engineering Design Under Uncertainty (gave lectures to Lab), NU, 2023
3. MAE 548 Probabilistic Methods for Engineering Design and Analysis (gave lectures on fundamental probability and Bayesian statistics), ASU, 2022
4. ASU 101 The ASU Experience (led lab tours), ASU, 2022

WORKSHOPS

1. Artificial Intelligence for Materials Science workshop, online, National Institute of Standards and Technology, 2023
2. Mentored Discussions of Teaching, Northwestern University, 2023
3. Artificial Intelligence for Materials Science, online, National Institute of Standards and Technology, 2022

4. Machine Learning for Materials Research, online, University of Maryland, 2022
5. Responsible Conduct for Research Training, online, Northwestern University, 2022