

## Fan Chen

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### EDUCATION

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#### University of Liege

- 2024-2025: Research Scientist, *Urban and Environmental Engineering* (Funded by European Union), Supervisor- Anne Marie Habraken: anne.habraken@uliege.be

#### Northwestern University

- 2022-2023: Postdoc, *McCormick School of Engineering, AMPL* (USA Vannevar Bush Faculty Fellowship award), Supervisor- Jian Cao: jcao@northwestern.edu

#### National University of Singapore

- 2018-2022: Ph.D., *Mechanical Engineering* (Singapore research scholarship), Supervisor- Wentao Yan: mpeyanw@nus.edu.sg

#### Huazhong University of Science & Technology

- 2015-2018: Master of Engineering, *Design & Manufacture of Ships and Marine Structure* (China Graduate Scholarship)
- 2011-2015: Bachelor of Engineering, *Naval Architecture & Ocean Engineering* (2012 China National Scholarship)

### MAJOR SKILLS

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- Chinese, English, French (A2 level)
- Software: ABAQUS (User subroutines), COMSOL Multiphysics, FLOW 3D
- Programming languages: FORTRAN, Python, MATLAB

### PROFESSIONAL EXPERIENCE

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#### Reviewer for Journals:

*Journal of Materials Processing Tech // Additive Manufacturing // Chinese Journal of Mechanical Engineering: Additive Manufacturing Frontiers // Smart Manufacturing*

#### Teaching and internship:

2018-2022, in National University of Singapore

- Teaching Assistant at the department of Mechanical Engineering, NUS:
  - ME1102 - Engineering Principles and Practice I
  - ME2112 - Strength of Materials
  - ME2115 - Mechanics of Machines: Vibration Lab
- Internship at Agency for Science, Technology and Research (A\*STAR) in Singapore - display board <https://www.a-star.edu.sg/ihpc/internship/chen-fan>

#### Projects:

2018-2022, in National University of Singapore

- High-fidelity coupled CFD-FEM simulation on DED and LPBF** -- corporation with ANSYS  
Linked the high-fidelity molten pool dynamics model with the finite element solver for thermal stress simulation.
- High-density dislocations in additively manufactured metals** -- corporation with Shanghai Jiaotong University  
Demonstrated that thermal stresses are the origin of high-density dislocations in additively manufactured metals using the coupled CFD-FEM simulation.
- Physically informed data-driven prognostic model for the temperature prediction in AM** -- corporation with Singapore A\*STAR  
High accuracy and significantly faster computation speed for the track-scale AM modeling based on the data-driven prediction (CNN, GPR, QR) of the isotherms and the isotherm-reconstructed temperature attribution on FEM model.
- Pattern-oriented Strain Attribution in Part-scale Modeling of Additive Manufacturing** -- corporation with Singapore A\*STAR  
Efficient large-scale AM modeling approaches with sound physical basis, where the layer-wise element progressive activation is applied with base strain pattern attributed onto the sample layers.

2022 – 2023 in Northwestern University

- **Hybrid Autonomous Manufacturing, Moving from Evolution to Revolution (HAMMER)** -- corporation with N.C. A&T State University et al.  
High-fidelity English wheel simulation: distortion analysis of the sheet metal under rolling of two wheel of different size and curvature.
- **Micro-Casting of Titanium Alloy in Self-boiling Molds**  
Heat transfer analysis of liquid materials in multiple self-boiling molds for micro-casting.
- **DED on sheet metal forming** -- corporation with Nissan  
Deformation prediction using bulking analysis under the residual stress pattern achieved by track-scale DED simulation.  
2023 – present in University of Liege
- **AI powered characterization and modelling for green steel technology** (Funded by European Union) -- corporation with Fraunhofer, IWM and IMDEA et al.  
Fortran-based self-developed Lagamine coding platform for implementation of H. Morch visco-plasticity law & Development of the mean field creep model on Gitlab using Python.

## PUBLICATIONS

- **Fan Chen**, Yang, M., & Yan, W. (2022). Data-driven prognostic model for temperature field in additive manufacturing based on the high-fidelity thermal-fluid flow simulation. *Computer Methods in Applied Mechanics and Engineering*, 392, 114652. <https://doi.org/10.1016/j.cma.2022.114652>
- **Fan Chen**, & Yan, W. (2020). High-fidelity modelling of thermal stress for additive manufacturing by linking thermal-fluid and mechanical models. *Materials & Design*, 196, 109185. <https://doi.org/10.1016/j.matdes.2020.109185>
- **Fan Chen**, Kozjek, D., Porter, C., & Cao, J. (2025). Acceleration of powder-bed-size thermal simulation considering scanning-path-scale through a pseudo-layer-wise equivalent heat flux model. *Journal of Manufacturing Processes*, 134, 394-409. <https://doi.org/10.1016/j.jmapro.2024.12.057>
- **Fan Chen**, Rujing, Z., Jihoon, J., Liao, S., Cao, J. (2025) Directed energy deposition on sheet metal forming for reinforcement structures. *Journal of Manufacturing Processes* 144, 339-349. ---- won the North American Manufacturing Research Conference (NAMRC) 53 Outstanding Paper Award in Manufacturing Processes <https://doi.org/10.1016/j.jmapro.2025.03.120>
- **Ziyuan Xie & Fan Chen (co-first author)**, L., Ge, W., & Yan, W. (2024). Data-driven prediction of keyhole features in metal additive manufacturing based on physics-based simulation. *Journal of Intelligent Manufacturing*, 35(5), 2313-2326. <https://doi.org/10.1007/s10845-023-02157-6>
- Derick, S., **Fan Chen**, Kang, P., Forbes, B., Gao, M., Ineza, O., ... & Cao, J. (2024). On the feasibility of an integrated English wheel system. *Journal of Manufacturing Systems*, 74, 665-675. <https://doi.org/10.1016/j.jmsy.2024.04.022>
- Wu, W., Zhou, Y., Liu, Q., Ren, L., **Fan Chen**, Fuh, J. Y. H., ... & Li, G. (2023). Metallic 4D printing of laser stimulation. *Advanced Science*, 10(12), 2206486. ---- selected as the Cover Page on Journal "Advanced Science 12/2023." <https://doi.org/10.1002/advs.202206486>
- Li, G., Yang, S., Wu, W., **Fan Chen**, Li, X., Tian, Q., ... & Ren, L. (2023). Biomimetic 4D printing catapult: from biological prototype to practical implementation. *Advanced Functional Materials*, 33(32), 2301286. <https://doi.org/10.1002/adfm.202301286>
- Chen, H., Wei, Q., Zhang, Y., **Fan Chen**, Shi, Y., & Yan, W. (2019). Powder-spreading mechanisms in powder-bed-based additive manufacturing: Experiments and computational modeling. *Acta Materialia*, 179, 158-171. <https://doi.org/10.1016/j.actamat.2019.08.030>
- Wang, G., Ouyang, H., **Fan Chen**, Guo, Q., Li, Z., Yan, W., & Li, Z. (2020). The origin of high-density dislocations in additively manufactured metals. *Materials Research Letters*, 8(8), 283-290. ---- won Materials Research Letters (MRL) 2022 Impact Award <https://doi.org/10.1080/21663831.2020.1751739>
- Giam, A., **Fan Chen**, Cai, J., & Yan, W. (2023). Factorial design analytics on effects of material parameter uncertainties in multiphysics modeling of additive manufacturing. *npj Computational Materials*, 9(1), 51. <https://doi.org/10.1038/s41524-023-01004-9>

- Li, Z., Cui, Y., Yan, W., Zhang, D., Fang, Y., Chen, Y., Qian, Y., Ge, W., Heng, O., **Fan Chen**, ... & Wang, Y. M. (2021). Enhanced strengthening and hardening via self-stabilized dislocation network in additively manufactured metals. *Materials Today*, 50, 79-88. <https://doi.org/10.1016/j.mattod.2021.06.002>
- Grilli, N., Hu, D., Yushu, D., **Fan Chen**, & Yan, W. (2022). Crystal plasticity model of residual stress in additive manufacturing using the element elimination and reactivation method. *Computational Mechanics*, 1-21. <https://doi.org/10.1007/s00466-021-02116-z>
- Deng, Q., **Fan Chen**, Wang, L., Liu, Z., Wu, Q., Chang, Z., ... & Ding, W. (2025). Exceptional strength paired with increased cold cracking susceptibility in laser powder bed fusion of a Mg-RE alloy. *Journal of Materials Science & Technology*, 213, 300-314. <https://doi.org/10.1016/j.jmst.2024.07.005>
- Bouffieux, C., Papeleux, L., Calvat, M., Tran, H. S., **Fan Chen**, Ponthot, J. P., ... & Habraken, A. M. (2024). Efficient Representative Volume Element of a Matrix–Precipitate Microstructure—Application on AlSi10Mg Alloy. *Metals*, 14(11), 1244. <https://doi.org/10.3390/met14111244>
- Bryndza, G., Tchuindjang, J. T., **Fan Chen**, Habraken, A. M., Sepúlveda, H., Tuninetti, V., ... & Duchêne, L. (2025). Review of the Microstructural Impact on Creep Mechanisms and Performance for Laser Powder Bed Fusion Inconel 718. *Materials*, 18(2), 276. <https://doi.org/10.3390/ma18020276>

### CONFERENCE PRESENTATIONS

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- (August 27, 2017. Hong Kong) *43rd International Congress on Noise Control Engineering*, Free vibration characteristics analysis of rectangular plate with central opening using in arbitrary boundary conditions.
- (August 1, 2021. Texas, US.) *International Solid Freeform Fabrication Symposium*, High-fidelity Modelling of Thermal Stress for Additive Manufacturing by Linking Thermal-fluid and Mechanical Models.
- (September 26, 2021. California, US.) *Mechanistic Machine Learning and Digital Twins for Computational Science, Engineering & Technology*, Data-driven prognostic model for temperature field in additive manufacturing based on the high-fidelity thermal-fluid flow simulation.
- (July 23-27, 2023. New Mexico, US.) *17<sup>th</sup> U.S. National Congress on Computational Mechanics*, Enhanced Large-Scale Modeling of Additive Manufacturing: Layer-Wise Equivalent Heat Flux Attribution for Thermal Interaction Analysis Across Multiple Fabrications.

### PATENTS & DISCLOSURES

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A Novel Inherent Strain Modelling Tool to Predict Thermal Stress and Distortion in Additive Manufacturing. ILO Ref: 2020-156. Yan Wentao, **Fan Chen**.

### ONLINE PORTFOLIOS

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ResearchGate: <https://www.researchgate.net/profile/Fan-Chen-51>

LinkedIn: <https://www.linkedin.com/in/fan-chen-75956b23b/>

Google scholar: <https://scholar.google.com/citations?hl=en&user=NSwBSDUAAAAJ>

ORCID: <https://orcid.org/0000-0003-2823-6667>