Hao Yin

Phone: +44 7570634748   E-mail: kingyin3613@foxmail.com   Website: http://haoyin.io

EDUCATION

Postdoc @ University of Cambridge   Advisor: Vikram Deshpande   07/2024 – present

Postdoc @ Northwestern University   Advisor: Gianluca Cusatis   01/2024 – 06/2024

Ph.D. in Civil Engineering @ Northwestern University   Advisor: Gianluca Cusatis   09/2018 – 12/2023

Thesis: *Discrete Modeling of Fracture and Flow in Porous Quasi-brittle Materials by Capturing the Internal Structure*

Committee: Zdeněk Bažant, Gianluca Cusatis, Eric Landis, and John Rudnicki

M.S. in Civil Engineering @ University of Illinois at Urbana-Champaign (UIUC)   09/2016 – 05/2018

B.S. in Civil Engineering @ China Agricultural University (CAU)   09/2012 – 06/2016

PUBLICATIONS

1. **Yin, H.** and Cusatis, G., 2025. **Generative conforming delaunay graph for discrete modeling of intercellular transport**. *Journal of Open Source Software, In preparation*.

2. Huang, C., Shen, L., Yu, W., Alkayem, N., **Yin, H.** and Cusatis, G., 2024. **High-fidelity method for mesoscopic rheology of fresh fiber-reinforced concrete based on sph-dem**. *International Journal of Mechanical Sciences, Under Review*.

3. **Yin, H.**, Treomner, M., Li, W., Yang, L., Shen, L., Alnaggar, M., Di Luzio, G. and Cusatis, G., 2024. **An interprocess communication-based two-way coupling approach for implicit-explicit multiphysics lattice discrete particle model simulations**. *Engineering Fracture Mechanics, 310*, p.110515.

4. **Yin, H.**, Landis, E., and Cusatis, G., 2024. **Connector-beam lattice model for wood: from micromorphology simulation to macroscopic behaviors prediction**. *Journal of the Mechanics and Physics of Solids, Under Review*.

5. **Yin, H.**, Cibelli, A., Brown, S.A., Yang, L., Shen, L., Alnaggar, M., Cusatis, G., and Di Luzio, G., 2023. **Flow lattice model for the simulation of chemistry dependent transport phenomena in cementitious materials**. *European Journal of Environmental and Civil Engineering, 28*(5), pp.1039-1063.

6. Tong, D., Brown, S.A., **Yin, H.**, Corr, D., Landis, E., Di Luzio, G. and Cusatis, G., 2023. **Orthotropic hygroscopic behavior of mass timber: theory, computation, and experimental validation**. *Materials and Structures, 56*(6), p.109.

7. **Yin, H.** and Cusatis, G., 2023. **Ringspy: a python package for voronoi mesh generation of cellular solids with radial growth pattern**. *Journal of Open Source Software, 8*(83), p.4945.

8. Eliáš, J., **Yin, H.** and Cusatis, G., 2022. **Homogenization of discrete diffusion models by asymptotic expansion**. *International Journal for Numerical and Analytical Methods in Geomechanics, 46*(16), pp.3052-3073.

9. Shen, L., Zhang, H., Di Luzio, G., **Yin, H.**, Yang, L. and Cusatis, G., 2022. **Mesoscopic discrete modeling of multiaxial load-induced thermal strain of concrete at high temperature**. *International Journal of Mechanical Sciences, 232*, p.107613.

10. **Yin, H.**, Lale, E. and Cusatis, G., 2022. **Generalized formulation for the behavior of geometrically curved and twisted three-dimensional timoshenko beams and its isogeometric analysis implementation**. *Journal of Applied Mechanics, 89*(7), p.071003.

11. Wang, C., Peng, H., Bian, L., **Yin, H.**, Sofi, M., Song, Z. and Zhou, Z., 2021. **Performance of alkali-activated cementitious composite mortar used for insulating walls**. *Journal of Building Engineering, 44*, p.102867.

12. Jing, G.Q., Aela, P., Fu, H. and **Yin, H.**, 2019. **Numerical and experimental analysis of single tie push tests on different shapes of concrete sleepers in ballasted tracks**. *Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit, 233*(7), pp.666-677.

13. **Yin, H.**, Qian, Y., Edwards, J.R. and Zhu, K., 2018. **Investigation of relationship between train speed and bolted rail joint fatigue life using finite element analysis**. *Transportation Research Record, 2672*(10), pp.85-95.

14. Shao, S., Jing, G. and **Yin, H.**, 2016. **Ballast flight risk assessment based on reliability theory**. *International Journal of Simulation Systems, Science & Technology, 17*, p.36.

15. Wang, Z., Jing, G., Yu, Q. and **Yin, H.**, 2015. **Analysis of ballast direct shear tests by discrete element method under different normal stress**. *Measurement, 63*, pp.17-24.

PRESENTATIONS

1. **Yin, H.**, Treomner, M., Li, W., Lale, E., Alnaggar, M., Yang, L., Shen, L., Di Luzio, G., and Cusatis, G., 2024. **Multi-physics lattice discrete particle model (m-ldpm) for the coupling of diffusion processes and fracture**. *ASCE EMI/PMC 2024 Conference,* Chicago, IL.

2. Treomner, M., Brown, S.A., **Yin, H.**, and Cusatis, G., 2024. **Connector and beam lattice (cbl) model for the simulation of wood under high strain rates**. *ASCE EMI/PMC 2024 Conference,* Chicago, IL.

3. Cusatis, G, **Yin, H.**, Treomner, M., Li, W., Pathirage, M., Alnaggar, M., Yang, L., Shen, L., and Di Luzio, G., 2024. **A multiphysics-lattice discrete particle model (m-ldpm) framework for fully coupled fracture-fluid interactions**. *Concreep12 Conference,* Delft, The Netherlands.

4. **Yin, H.**, Lale, E., and Cusatis, G., 2022. **A novel 3d discrete beam lattice model: from mesostructure to macroscopic behaviors of wood**. *ASCE EMI 2022 Conference,* Baltimore, MD.

PATENTS

1. **Yin, H.**, **"A Water Damage Test Device for Asphalt Concrete Pavements"**. *CN Patent #2014207575876*, 2015.

2. **Yin, H.**, **"A Railway Ballast Cover Plate"**. *CN Patent #2014203065268*, 2014.

RESEARCH EXPERIENCE

Graph-based Learning and design of Advanced Mechanical Metamaterials   07/2024 – Present

The UKRI Engineering and Physical Sciences Research Council Project EP/X02394X/1

- Conducted theoretical and computational analyses of Indentation Size Effect (ISE) of 2D and 3D octet-truss architected solids.
- Conducted in-situ x-ray CT and digital volume correlation (DVC) measurement of indentation tests of 3D octet-truss architected solids.

Computational Tools for the Multiscale Simulation of Engineered Wood Products (EWP) Under Dynamic Loading Conditions   07/2022 – 06/2024

A Project Funded by the U.S. Army Engineer Research and Development Center (ERDC)

- Formulated a mixed-mode constitutive model for dynamic and strain-rate effects in wood fracture.
- Developed a **dynamic Connector-Beam Lattice (dynaCBL)** model for simulating strain-rate dependent behaviors of Engineered Wood Products (EWP) under impact loading conditions.

High Performance Fiber Reinforced Concrete Systems using Carbon Fibers at Multiple Length Scales   01/2023 – 09/2023

A Project Funded by ExxonMobil

- Designed and conducted mechanical property tests of nanomodified concrete with carbon nanotubes (CNT) and turbostratic graphenes.

Enabling Innovation in Sustainable Structural Building Systems Through Multiscale Modeling and Experimentation of Mass Timber   07/2018 – 06/2022

The National Natural Science Foundation Project CMMI-1762757

- Derived a Generalized Timoshenko beam theory and implemented with Isogeometric Analysis (IGA).
- Developed the **Connector-Beam Lattice (CBL) model** – a discrete modeling framework to investigate the heterogeneous and anisotropic mechanical and fracture behaviors of wood.
- Developed a computational pipeline for the preprocessing-analysis-postprocessing for the CBL model.

PROFESSIONAL EXPERIENCE

Research Associate   07/2024 – Present

Department of Engineering, University of Cambridge

Postdoctoral Scholar   01/2024 – 06/2024

Department of Civil and Environmental Engineering, Northwestern University

Graduate Research Assistant   09/2018 – 12/2023

Department of Civil and Environmental Engineering, Northwestern University

Graduate Teaching Assistant   01/2019 – 04/2022

Northwestern University

- CIV_ENV 216: Mechanics of Materials (19 Winter, 20 Winter, 20 Spring, 21 Spring, 22 Winter)

- MECH_ENG 327: Finite Elements Methods in Mechanics (20 Fall)

Graduate Research Assistant   01/2017 – 12/2017

Rail Transportation and Engineering Center (RailTEC), University of Illinois at Urbana-Champaign

Structural Design Intern   06/2015 – 09/2015

Beijing Institute of Architectural Design (BIAD), Beijing, China

HONORS & AWARDS

Graduate Research Fellowship   *Northwestern University*   09/2018

Excellent Student Scholarship & Academic Excellence Scholarship   *China Agricultural University*   06/2014

PROFESSIONAL SERVICES & ACTIVITIES

Member   2023 – present

American Society of Civil Engineers (ASCE), American Society of Mechanical Engineers (ASME)

Conference Session Moderator   06/2021

The 6th Biot-Bažant Conference on Engineering Mechanics and Physics of Porous Materials and Structures

Journal Paper Reviewer   2018 – present

Transportation Research Record, Journal of Open Source Software, Mathematics and Mechanics of Solids,

Wood Science and Technology, Journal of Building Engineering, Structural Concrete, Measurement, etc.