Geng Niu

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3D printed concrete, Low-density Concrete

EDUCATION

Southeast University, China

- M.S. in Material Science and Engineering 2021 - present
  (Advisor: Prof. Yamei Zhang) (Average Score: 89.35/100, GRE: 330)
- B.S. in Material Science and Engineering 2017 - 2021
  (GPA: 3.7/4.0, Average Score: 88.55/100)

RESEARCH EXPERIENCES

Jiangsu Key Laboratory of Construction Materials, Southeast University 12/2018 – present

Advisor: Prof. Yamei Zhang
Research Topics: 3D printed concrete[3] [4], Low-density Concrete[1] [2]

Research Title: **3D-Printed EPS Lightweight Concrete with Varying Densities**[1]

- Utilized EPS particles as lightweight aggregates for the preparation of 3D printed lightweight concrete, printing EPS concrete with varying densities through different proportions of EPS particles
- Properties characterization, including rheological properties and mechanical performance assessment
- Employed and enhanced the excess paste theory to elucidate the changes in rheological properties resulting from the incorporation of EPS particles
- Applied X-ray Computed Tomography (X-CT) to get the reconstruction images of specimens and used the u-Net method to segment, enabling the analysis of the distribution of EPS particles and voids

Research Title: **Study on Preparation and Performance of 3D Printed Foam Concrete**[2]

- Used viscosity-modifying agents (HPMC) to fabricate 3D printed foam concrete and enhanced its mortar stability and printability
- Elucidated the impact of supplementary cementitious materials on the properties of foam concrete through analysis of rheological and mechanical properties

Research Title: **Preparation and Performance of High Crack Resistant Foam Concrete**

- Prepared foam concrete with various fine aggregates and fiber to enhance strength and diminish shrinkage
- Adopted X-CT and Scanning Electron Microscopy (SEM) to analyze the pore size and microstructure distribution of hardened concrete

PUBLICATIONS

Journal Articles († indicates co-first author, * indicates correspondent author)

1. **Geng Niu**, Chao Liu, Lutao Jia, Lei Ma, Yifan Shi, Yifan Jiang, Zijian Jia, Yu Chen, Nemkumar Banthia, & Yamei Zhang*. (2024). Preparation and Performance Analysis of 3D Printed Lightweight EPS Concrete: Insights from the Excess Paste Theory. *Cement and Concrete Composites*, 149, 105509. [doi]
2. Chao Liu, Yuning Chen, Zedi Zhang, **Geng Niu**, Yuanliang Xiong, Lei Ma, Qi Fu, Chun Chen, Nemkumar Banthia, & Yamei Zhang*. (2022). Study of the Influence of Sand on Rheological

Properties, Bubble Features and Buildability of Fresh Foamed Concrete for 3D Printing. *Construction and Building Materials*, 356, 129292. [doi]

3. Lei Ma, Qing Zhang, Hélène Lombois-Burger, Zijian Jia, Zedi Zhang, **Geng Niu**, & Yamei Zhang*. (2022). Pore Structure, Internal Relative Humidity, and Fiber Orientation of 3D Printed Concrete with Polypropylene Fiber and Their Relation with Shrinkage. *Journal of Building Engineering*, 61, 105250. [doi]

Manuscripts Drafted and Under Preparation

4. Lutao Jia, **Geng Niu**, Enlai Dong, Zijian Jia, Xianggang Wang, Yifan Jiang, Yu Chen, Yueyi Gao, Yamei Zhang*. (manuscript drafted). Systematical investigation of pore structure in 3D-printed concrete containing recycled brick powder, and corresponding impact on mechanical properties and drying shrinkage.

PROFESSIONAL EXPERIENCES

Teaching Assistant

- Cement Chemistry 2022

Equipment Operator & Data Analyst

- Y.CT precision, X-ray tomography scanner, Southeast University 04/2022 – 06/2024
- Zeiss Xradia 510 Versa, 3D X-ray microscope, Southeast University 04/2022 – 06/2024

INTERNSHIP

Handan Longcheng Construction Engineering Co., Ltd. 06/2018 – 08/2018

- Position: Technician
- Executed testing, characterization, and comprehensive documentation of raw material properties for ready-mixed concrete.
- Devise and adjust the concrete mix based on the characteristics of the raw materials.
- Implemented sampling and inspection procedures for delivered ready-mixed concrete products.

HONORS & AWARDS

- First-Class Postgraduate Scholarship, Southeast University (Top 10%) 2021
- Changwen Miao Scholarship, Southeast University (Top 6%) (Twice) 2019 – 2020