Geng Niu

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3D printed concrete, Low-density Concrete

EDUCATION

Southeast University

- M.S. in Material Science and Engineering 2021 - present
  (Advisor: Prof. Yamei Zhang) (Average Score: 89.35/100, GRE: 330, TOEFL: 94)
- 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[2] [4], Low-density Concrete[1] [3]

Research Title: **3D-Printed EPS Lightweight Concrete with Varying Densities**[3] [4]

- 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**[1]

- 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

Assoc. Prof. Peigen Zhang's Lab, Southeast University 12/2019 – 08/2021

Advisor: A.P. Peigen Zhang
Research Title: **Study on Preparation and Performance of Diamond-MAX Composite Materials**

- Employed two distinct sintering processes, namely Pressureless Sintering and Spark Plasma Sintering (SPS), for the fabrication of the MAX phase, with SPS selected as the preferred sintering method for composite material synthesis
- Selected several diamond particle gradations during the composite material preparation and conducted thermal conductivity evaluations on the samples
- Analyzed the composition and microstructure of the composite material through SEM and X-ray Diffraction (XRD) analyses

Prof. Pan Feng's Lab, Southeast University 12/2019 – 08/2021

Advisor: Prof. Pan Feng
Research Title: **Super-wood Reinforced Concrete**

- Developed a thermal compression apparatus for the fabrication of super-wood and synthesized super-wood through alkali treatment, water washing, and thermal compression
- Conducted characterization of super-wood, evaluating parameters including tensile strength, water absorption, and volumetric stability
- Utilized super-wood as a reinforcing material for fabricating reinforced concrete, followed by assessments of the bond strength between super-wood and concrete

PUBLICATIONS

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

1. Liu, Chao, 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.
2. Ma, Lei, 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.

Manuscripts Drafted and Under Preparation

3. **Geng Niu**, Liu Chao, & Yamei Zhang*. (manuscript drafted). Excess Paste Thickness, Rheology and EPS Distribution of 3D-Printed EPS Lightweight Concretes with Varying Densities.
4. **Geng Niu**, & Yamei Zhang*. (in prep). Influencing Factors and Analysis of Excess Paste Layer.

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
- Excellent League Member, Southeast University 2018

PROFESSIONAL EXPERIENCES

Teaching Assistant

- Cement Chemistry 2022

Equipment Operator & Data Analyst

- Y.CT precision, X-ray tomography scanner, Southeast University 2022 - present
- Zeiss Xradia 510 Versa, 3D X-ray microscope, Southeast University 2022 - present