

# Tianyu Gu

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## Education

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### Tongji University, Shanghai, China

Sept. 2019 – Present

Master of Engineering (Structural Engineering, School of Civil Engineering)

Advisor: Prof. Xianzhong Zhao

Vice advisor: Prof. Liang-Jiu Jia

Overall GPA: 90.6 / 100

Major GPA: 91.8 / 100

- Awarded China National Scholarship (top 1%) in 2021

### Southwest Jiaotong University (SWJTU), Chengdu, China

Sept. 2015 – Jun. 2019

Bachelor of Engineering (Structural Engineering, School of Civil Engineering)

Overall GPA: 88.5 / 100

Major GPA: 91.6 / 100

- Awarded China National Scholarship (top 1%) twice respectively in 2016 and 2017
- Awarded Linxin Tang Scholarship (top 0.2%)
- Awarded Top-Grade Scholarship of SWJTU (top 1%) three times
- Awarded 1<sup>st</sup> Prize in National Structure Design Competition (Sichuan Division)
- Awarded the ‘Si Shi Yang Hua’ Medal (highest student honor in SWJTU, top 0.1%)
- Awarded Excellent Undergraduate Thesis in SWJTU (top 1%)
- Awarded Outstanding Graduate Student of Sichuan Province (top 1%)

## Language & Software Skills

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- TOFEL 110 (L27, R29, S27, W27) Nov. 2020
- GRE 332 (V163, Q169) + AW4.0 Jun. 2021
- MATLAB, ABAQUS, Midas, Origin, Avizo; Python (Pytorch, Sklearn, Numpy, Opencv, etc.)

## Publications & Patents

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- **Tianyu Gu**, Liang-Jiu Jia\*, Bo Chen, Min Xia, Hongyan Guo, Man-Chao He\*, Unified full-range plasticity till fracture of meta steel and structural steels, *Engineering Fracture Mechanics*, 2021, 107869. <https://doi.org/10.1016/j.engfracmech.2021.107869>. (SCI, Q1, IF=4.406)
- **Tianyu Gu**, Jiong-Hui Li, Jubo Sun, Liang-Jiu Jia\*, Tao Liu, Hanbin Ge\*, Experimental study on miniature buckling-restrained brace with corrugated core bar, *Journal of Earthquake Engineering*, 2021, 1-23. <https://doi.org/10.1080/13632469.2021.1927907>. (SCI, Q1, IF=3.994)
- **Tianyu Gu**, Sen Yang, Dongzhi Guan, Liang-Jiu Jia\*, Analytical model for local bulging failure of mini-BRBs with circular restraint tubes, *Journal of Constructional Steel Research*, 2021, 183, 106722. <https://doi.org/10.1016/j.jcsr.2021.106722>. (SCI, Q1, IF=3.646)
- Feifei Shao, **Tianyu Gu**, Liang-Jiu Jia\*, Hanbin Ge\*, Miki Taguchi, Experimental study on damage detectable brace-type shear fuses, *Engineering Structures*, 2020, 225, 111260. <https://doi.org/10.1016/j.engstruct.2020.111260>. (SCI, Q1, IF=4.471)
- Liang-Jiu Jia, **Tianyu Gu**, Yan Liu, Hanbin Ge\*, Theoretical bulging analysis on miniature buckling-restrained brace with corrugated core bar, *Engineering Structures*. (Under Review)
- Liang-Jiu Jia, Chang-Feng Zhou, Rui Zhang, **Tianyu Gu**, Tao Liu, Jinbao Xie, Man-Chao He\*, Min Xia\*, Bo Chen\*, Micro ductile fracture mechanism of a meta-steel with auxetic effect through in-situ three-dimensional investigation, *Science Advances*. (Under Review)
- Rui Guo, Yu Ren, **Tianyu Gu**, Experimental study on shear behavior of RC beam strengthened

with FRP mesh and ECC, *Industrial Construction*, 2019, 49, 145-151+17. (EI, in Chinese)

- Rui Guo, **Tianyu Gu**, Solver for bearing capacity of RC beam strengthened with FRP and ECC, 2019. (Software copyright registered by the State Copyright Administration)

## Research & Project Experience

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### **Multi-Scale Analysis on Ductile Fracture of Metal and Micro-Void Growth Model based on Deep Learning (Master Thesis, In Progress)**

*Mar. 2021 – Present, Shanghai*

- This study investigates macro ductile fracture behavior of metal from a microscopic perspective (micro-void evolution) and aims to establish a micro-void growth model.
- In-situ X-ray micro-CT experiments towards metallic coupons under monotonic tension till fracture were conducted, and then void evolution data were 3D reconstructed. Moreover, void recognition in SEM photos was realized through convolutional neural network (CNN).
- Based on the void data from experiments and numerical representative volume element (RVE) analyses, recurrent neural network (RNN) will be adopted to predict the growth of void.

### **Investigation on Mechanical Properties, Size Effects and Full-Range Plasticity of a New Type of NPR Steel and Conventional Structural Steels**

*Nov. 2020 – Mar. 2021, Shanghai*

- I investigated meta-steel with auxetic effect (termed as NPR steel), a novel metallic material, and compared it with conventional steels for mechanical properties.
- I conducted an experiment towards different steel coupons using digital image correlation (DIC), and then conducted numerical analyses to simulate their ductile fracture behaviors.
- A curious ‘necking lag’ effect was observed and then a new post-necking true stress – true strain modification method was proposed.

### **Experimental and Theoretical Studies on Two New Types of Damping Devices**

*Sept. 2019 – Mar. 2020, Shanghai; Jul. 2020 – Dec. 2020, Shanghai*

- The two studies proposed and investigated a type of all-steel mini-BRB with corrugate core bar and a type of all-steel damage-detectable shear damper with uncoupled strength and stiffness.
- I was responsible for the experiments, theoretical analyses and numerical simulations.
- Design formulae of the two dampers were proposed and their design procedures were given.

### **Experimental Study and Analytical Model for Local Bulging Failure of Mini-BRBs with Circular Restraint Tubes**

*Mar. 2020 – Oct. 2020, Shanghai*

- This study investigated the mechanism of local bulging of circular constraint tube of mini-BRB (buckling-restrained brace) and established a mathematical model for bulging process.
- I was responsible for the experimental and theoretical analyses and numerical simulations.
- The model for the complex bulging process was simplified through a numerical algorithm, and a design criterion convenient for engineering applications was given to prevent bulging failure.

### **Experimental Study on Bending and Shear Behaviors of RC Beams Strengthened with FRP and ECC**

*Dec. 2018 – May. 2019, Chengdu*

- I participated in the design and experiment and developed a theoretical model for RC beam strengthened with FRP and ECC, and wrote a software with GUI capable of predicting failure mode and load – displacement curve of strengthened RC beam by MATLAB.

### **ASCE Concrete Canoe Competition**

*Oct. 2016 – Mar. 2018, Chengdu (preparation); Mar. 2018 – Apr. 2018, Sacramento*

- This competition encourages undergraduates to construct concrete canoes and finally to compete in a canoe race. SWJTU participated in it for the first time in 2018. I was responsible for design and construction of the canoe. We won 6<sup>th</sup> place in the Mid-Pacific Conference.