

# Tianyu Gu

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## Education

### 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

### 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

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

## Publications & Patents

- **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**

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

*Nov. 2020 – 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 computed tomography experiments towards steel coupons under monotonic tension till fracture were conducted, and the X-ray images were processed by an algorithm for automatic void segmentation and then void evolution data can be 3D reconstructed.
- Based on the huge amounts of void data from experiments and numerical representative volume element (RVE) analyses, recurrent neural network is 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 and established a complicated mathematical model for bulging process.
- I was responsible for the 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 of RC beam specimens, developed a theoretical model for RC beam strengthened with FRP and ECC, and wrote a software with GUI capable of predicting the load – displacement curve of strengthened RC beam.

### **ASCE Concrete Canoe Competition**

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

- This competition encourages undergraduates to construct concrete canoes by themselves and finally have a canoe race together. SWJTU participated in it for the first time in 2018.
- I was responsible for mechanical design and construction of the canoe ‘Lotus’ and I made the presentation in Sacramento, California. We won the 6<sup>th</sup> place in the Mid-Pacific Conference.