

# Yingchao Peng

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[Google Scholar Profile](#)

## EDUCATION

### University of Southern California (USC)

CA, USA

- Ph.D candidate in Aerospace and Mechanical Engineering, GPA 3.97/4.0

Sep. 2020-Dec.2025

(Expected)

- Advisor: Professor Paul Plucinsky

### The University of Tokyo (UTOKYO)

Tokyo, Japan

- M.E in Systems Innovation, GPA 3.78/4.0

Sep. 2016-Sep. 2019

- Advisor: Professor Katsuyuki Suzuki
- Thesis: *Robust Topology Optimization under Uncertainty*

### Huazhong University of Science and Technology (HUST)

Hubei, China

- B.E in Naval Architecture and Ocean Engineering, GPA 3.84/4.0

Sep. 2012-June 2016

- Advisor: Professor Tianyun Li
- Thesis: *Simulation Analysis of Structural Crashworthiness in Ship Collision*
- Selected Awards:
  - ✧ Outstanding Graduate of HUST, 2016
  - ✧ First Prize for Entrepreneurship Business Competition in HKUST Winter Camp, 2015
  - ✧ American Bureau of Shipping Fellowship, 2014
  - ✧ China Shipping Industry Fellowship, 2014
  - ✧ Academic Merit Scholarship, 2013

## RESEARCH INTERESTS

- Solid Mechanics
- Mechanical Metamaterials
- Topology Optimization
- Finite Element Methods
- Computational Mechanics

## PUBLICATIONS

### Peer-Reviewed Journal Publications ([ORCID ID: 0009-0004-9036-8091](#))

- **Yingchao Peng**, Imtiar Niloy, Megan Kam, Paolo Celli, Paul Plucinsky. "Programming bistability in geometrically perturbed mechanical metamaterials" *Phys. Rev. Appl.*, 22(1), 014073 (2024).
- Pingzhang Zhou, **Yingchao Peng**, Jianbin Du. "Topology optimization of bi-material structures with frequency-domain objectives using time-domain simulation and sensitivity analysis" *Struct. Multidisc. Optim.*, 63(2), 575-593 (2021).

## CONFERENCE PRESENTATIONS

- "Programming Bistability in Geometrically Perturbed Mechanical Metamaterials", ASME IMECE, Portland, OR, 2024.
- "Tunable Bistability in Mechanical Metamaterials through Geometric Perturbations", SoCal Solids Conference, University of Southern California, Los Angeles, CA, 2023.
- "Tunable Bistability in Mechanical Metamaterials through Geometric Perturbations", SES Annual Technical Meeting, University of Minnesota, Minneapolis, MN, 2023.

## RESEARCH EXPERIENCE

Programming bistability in geometrically perturbed mechanical metamaterials, USC

Sep. 2021-July 2024

Research Assistant (Advisor: Prof. Paul Plucinsky)

- Proposed a strategy that transforms a common, nonbistable metamaterial design into a bistable one.
- Introduced an optimization framework for bistable planar kirigami that incorporates a reduced-order model for the elastic energy, which can be applied to tune the designs with target morphing and mechanical properties.
- Illustrated the versatility of the framework through nonperiodic designs that achieve two arbitrarily shaped stable states.

**Topology optimization of bi-material structures with frequency-domain objectives using time-domain simulation and sensitivity analysis, THU**

Jan. 2020-Feb. 2021

*Research Assistant (Advisor: Prof. Jianbin Du)*

- Conducted numerical simulations to obtain optimized topological configurations using a novel time-domain method with frequency-domain objectives for bi-material structures.

**Robust topology optimization under uncertainty, UTOKYO**

Jan. 2018-Aug. 2019

*Research Assistant (Advisor: Prof. Katsuyuki Suzuki)*

- Conducted robust topology optimization for two dimensional structures under uncertainties in loading magnitude and direction via optimality criteria method.
- Proposed an approach to implement robust topology optimization for structures under uncertain distributed loads and verified the effectiveness by modeling carrier plate.
- Put forward two modified algorithms to obtain the topological configuration with more distinct boundary based on the standard optimality criteria method and verified the feasibility of these two methods.

**Optimization design for CFRP laminated golf club, UTOKYO**

Nov. 2016-May 2017

*Research Assistant (Advisor: Prof. Katsuyuki Suzuki)*

- Simulated a three-point bending test of CFRP laminated golf club and analyzed the structural response to different parameters (material properties and laminated angles) with LS-DYNA and LS-Prepost.
- Proposed an optimal CFRP laminated golf club model with improved bending strength by designing the parameters of outer 2 layers with LS-OPT and LS-DYNA.

**Simulation analysis of structural crashworthiness in ship collision, HUST**

Dec. 2015-June 2016

*Research Assistant (Advisor: Prof. Tianyun Li)*

- Analyzed the mechanical mechanism of ship-ship collision and the collision situation on the local scale.
- Modeled and simulated the collision of typical ship structures and analyzed the results by using LS-DYNA and LS-PREPOST.
- Analyzed the influence of collision parameters on the response of collision and put forward effective suggestions to improve crashworthiness.

**Structural design for ballast-free ship, HUST**

Mar. 2014-Aug. 2014

*Research Assistant (Advisor: Prof. Tianyun Li)*

- Proposed a new approach to optimize ship shape to design ballast-free ship effectively.
- Analyzed and compared the performances of the parent ship and the design ship with SESAM and MATLAB to verify feasibility of the approach.
- Conducted ship model experiments to validate the approach for designing ballast-free ship.

**MENTORSHIP**

**Viterbi School of Engineering, USC**

June 2024-July 2024

*SHINE (Summer High School Intensive in Next-Gen Engineering) program mentor*

& June 2022-July 2022

- Supervised two high school students on projects titled “Designing and Making Mechanism-Based Metamaterials” and “The Design and Deformations of Mechanism-Based Mechanical Metamaterials”.
- Mentored design, fabrication, and analysis of origami-inspired structures using MATLAB, laser cutting and hands-on experiments.
- Guided MATLAB programming to design planar kirigami patterns and simulate mechanism-based motions.
- Advised and supported the final research presentations delivered at the SHINE research symposium.

**TEACHING EXPERIENCE**

**Viterbi School of Engineering, USC**

Jan. 2025-May 2025

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*Teaching Assistant*

& Jan. 2023-May 2023

- *AME 204: Mechanics of Materials and Structures.* Tutored undergraduates, led discussion sections, held weekly office hours, prepared weekly quizzes and exams, graded assignments and examinations.

**Viterbi School of Engineering, USC**

Jan. 2025-May 2025

*Teaching Assistant*

- *AME 509: Applied Elasticity.* Led weekly office hours, graded assignments.

**School of Engineering, UTOKYO**

Aug. 2022-Dec. 2022

*Teaching Assistant*

- *Mathematical Programming and Optimization, Project Practice: Design for Paper Bridge.* Tutored undergraduates, led discussion sections, graded assignment and examination.

**School of Naval Architecture and Ocean Engineering, HUST**

June 2017-July 2018

*Teaching Assistant*

- *Calculus.* Conducted weekly Q & A sessions, designed midterm exam.

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**ADDITIONAL**

Nov. 2012-Jan. 2013

- **Professional skill:** MATLAB, Ansys LS-DYNA, LS-TaSC, Abaqus, Python, AutoCAD, C/C++
- **Language:** Chinese (Native), English (Fluent), Japanese (Fluent)
- **Leadership:** Leader of School Soccer Team
- **Interests:** Soccer, Badminton, Table tennis, Basketball