

HAOTIAN HANG

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CONTACT INFORMATION

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EDUCATION

- 2020 - **University of Southern California**, Los Angeles, CA
Ph.D. Candidate, Mechanical Engineering, (2022/8 passed qualifying exam, 2024 anticipated)
Master of Science, Mechanical Engineering, December 2021
Master of Science, Computer Science, 2024 anticipated
- 2015 - 2019 **Shanghai Jiao Tong University**, Shanghai, China
B.S. Aeronautics and Astronautics Engineering, June 2019 (Average Score: 89.22/100)

EMPLOYMENT

- 2020 - **Research Assistant**, Bio-Inspired Motion Lab at USC, PI: *Prof. Eva Kanso*
- 2019 **Intern Algorithmic Engineer**, Shanghai Hongpu Information Technology Co., Ltd.
Conduct flaw detection on images of photovoltaic cell using Faster R-CNN and yolov3
- 2016 - 2019 **Research Assistant**, J.C.Wu Center for Aerodynamics, PI: *Prof. Hong Liu*

PUBLICATIONS

- 2022 3. Hang, H., Heydari, S., Costello, J., & Kanso, E. (2022). *Active tail flexion in concert with passive hydrodynamic forces improves swimming speed and efficiency*. Journal of Fluid Mechanics, 932, A35.
- 2021 2. Xiang, Y., Hang, H., Qin, S., and Liu, H. (2021). *Scaling analysis of the circulation growth of leading-edge vortex in flapping flight*. Acta Mech. Sin.
- 2020 1. Hang, H., Yu, B., Xiang, Y., Zhang, B., and Liu, H. (2020). *An objective-adaptive refinement criterion based on modified ridge extraction method for finite-time Lyapunov exponent (FTLE) calculation*. Journal of Visualization, 23(1), 81-95.

TALKS/PRESENTATIONS

- 2022 **So Cal Fluids XV**, Learning to blindly follow hydrodynamic trails
- 2021 **APS Division of Fluid Dynamics Meeting**, Active tail flexion in concert with passive hydrodynamic forces improves swimming speed and efficiency
- 2020 **APS Division of Fluid Dynamics Meeting**, Flowtaxis in the wakes of oscillating airfoils
- 2018 **APS Division of Fluid Dynamics Meeting**, Passive rotation of a flapping wing with an inhomogeneous mass distribution

RESEARCH INTERESTS/EXPERIENCE

- 2020 - **Learning to blindly follow hydrodynamic trails**, supervised by *Prof. Eva Kanso*
joint with *Sina Heydari, Yusheng Jiao*
Employ reinforcement learning to follow vortical wakes based on local flow sensory
Find the importance of the wake's periodicity and traveling wave characteristic in source seeking
Analyze the controller in a simplified signal field and prove that stability of the controller depends on the location of sensor
Compare performance among different sensory cues, especially between mechano- and chemo- sensing
- 2020 - **Flexion in fish swimming**, supervised by *Prof. Eva Kanso, Prof. John H. Costello*
joint with *Sina Heydari*
Analyze the role of active and passive flexion on swimming speed and efficiency of a self-propelling pitching plate using vortex sheet method
Parametric study on effects of flexion phase, flexion angle and flexion ratio on swimming performance
Find overlap between biological data and the region we proposed to have hydrodynamic benefits in parameter space
- 2016 - 2019 **Mechanisms of high lift generation in insects flight**, supervised by *Prof. Hong Liu Dr. Yang Xiang and Dr. Suyang Qing*
Conduct experimental study using robotic flapping wing models in glycerin with Reynolds number similar to insects

Measure flow field using particle image velocimetry (PIV) and measure force and torque using 6-axis force sensor, analogue filter and NI data acquisition system
 Study difference in formation of leading edge vortex(LEV) for different kinematic modes, and find advanced rotation can generate a larger LEV because of wake capture
 Find a scaling law between passive rotation and active translation in flapping wing model

- 2016 - 2019 **AMR for FTLE calculation**, supervised by *Prof. Hong Liu, Prof. Bin Zhang, Bin Yu and Dr. Yang Xiang*
 Develop a physics-based adaptive refinement method for finite-time Lyapunov exponent calculation
- 2015 - 2016 **VTOL pitch-changed quadrotor**, supported by National Students' Platform for Innovation and Entrepreneurship Training, supervised by *Prof. Junqi Wu*
 joint with *Dongming Ding, Jihong Huang, Chaoqun Li, Zhikang Qiu*
 Lead a team to make a quadrotor and implement pitch-changed technique and VTOL technique in terms of both mechanical and control

TEACHING EXPERIENCE

- at University of Southern California**
- 2021 Spring **Teaching Assistant**, AME-526, Introduction to mathematical methods in engineering II, *Prof. Niema Pahlevan*
- 2020 Fall **Teaching Assistant**, AME-404, Computational Solutions to Engineering Problems, *Prof. Takahiro Sakai*

GRADUATE COURSEWORK

- at University of Southern California**
- 2022 EE-587, Nonlinear Control Systems
 CSCI-561, Foundations of Artificial Intelligence
 CSCI-567, Machine Learning
- 2021 CSCI-653, High Performance Computing and Simulations
 PHYS-516, Methods of Computational Physics
 EE-556, Stochastic Systems and Reinforcement Learning
 CSCI-570, Analysis of Algorithms
 AME-508, Machine Learning and Computational Physics,
 CSCI-596, Scientific Computing and Visualization
- 2020 AME-525, Engineering Analysis
 AME-526, Introduction to Mathematical Methods in Engineering II,
 AME-511, Compressible Gas Dynamics
 PHYS-760, Selected Topics in Computational Physics
 AME-451, Linear Control Systems I
 AME-541, Linear Control Systems II
 AME-535A, Introduction to Computational Fluid Mechanics
 AME-530A, Dynamics of Incompressible Fluids

HONOR/AWARDS

- 2020 USC Viterbi fellowship
- 2017-2018 Hui-Chun Chin and Tsung-Dao Lee Chinese Undergraduate Research Endowment of SJTU
- 2016 Honeywell Star Project
Second Place, Parts of the National College Students Physics Competition
Third Place, Chinese College Students' Mathematics Competition
- 2014 **First Place**, Chinese Chemistry Olympiad
First Place, Shanghai Adolescents Science and Technology Innovation Contest

SERVICE

- 2022 Judge, Undergraduate Symposium for Scholarly and Creative Work

ONLINE COURSEWORK

2022	C++ Nanodegree , Udacity Qiskit Global Summer School 2022 , IBM
2021	Build a Modern Computer from First Principles: From Nand to Tetris (Project-Centered Course), Coursera
2019	Specialization , DeepLearning.AI TensorFlow Developer , Coursera (containing 4 courses) Specialization , Deep Learning, Coursera (containing 5 courses)
2014	Machine Learning, Coursera, General Chemistry, Coursera

TECHNICAL SKILLS

Programming Language:	Python, Matlab, Fortran, C/C++, MySQL
Machine learning framework:	Pytorch, Tensorflow
Hardware:	Arduino, Raspberry Pi, Pixhawk
Other softwares/ tools:	Solidworks, Fusion 360, ROS/ROS2, Gazebo, github, L ^A T _E X, Docker, Ansys Fluent, Linux, MPI, OpenMP, cuda, Numpy, Scipy, matplotlib, pandas