# FEI LIU

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## RESEARCH INTERESTS

I work on *automatic algorithm design, combinatorial optimization, multiobjective optimization, expensive optimization, and their real-world applications.*
Recently, I am pretty interested in the *intersection of machine learning and optimization algorithms.* I have been focused on developing generalized *neural combinatorial optimization* methods.

## EDUCATION

**City University of Hong Kong (CityU)**, Hong Kong SAR
Ph.D. (student) candidate in Computer Science — 2020.09 – (Expected) 2024
Advisor: *Prof. Qingfu Zhang*, IEEE Fellow, Chair Professor

**Northwestern Polytechnical University (NPU)**, Shaanxi, China
M.Sc. in Fluid Mechanics — 2017.09 – 2020.04
Advisor: *Prof. Zhonghua Han*

**Northwestern Polytechnical University (NPU)**, Shaanxi, China
B.Eng. in Aircraft Airworthiness Technology — 2013.09 – 2017.07

## SELECTED AWARDS

- ***Gold Award**, China International College Students 'Internet+' Competition, Shaanxi Region* 2023
- ***Outstanding Master's Thesis Award***, Chinese Society of Aeronautics and Astronautics 2021
- ***Gold Award**, EMO 2021 HUAWEI Logistic Competition* 2021
- ***Outstanding Master's Thesis Award**, NPU* 2020
- ***Outstanding Graduate**, NPU* 2020

## EXPERIENCES

**Southern University of Science and Technology (SUSTech)**, Shenzhen, China
Visiting Scholar, SDIM — 2024.3 – now

**City University of Hong Kong (CityU)**, Hong Kong SAR
Teaching Assistant, Department of Computer Science — 2021 – 2023

**Universidad Politécnica de Madrid (UPM)**, Madrid, Spain
Exchange Student, Department of Applied Mathematics in Aerospace Engineering — 2016.01 – 2016.07
Advisor: *Prof. Ignacio Gómez Pérez*

## PAPERS & PATENT

**Paper**

1. **Fei Liu**, Xialiang Tong, Mingxuan Yuan, Xi Lin, Fu Luo, Zhenkun Wang, Zhichao Lu, and Qingfu Zhang. Evolution of heuristics: Towards efficient automatic algorithm design using large language model. *ICML*, 2024
2. **Fei Liu**, Xi Lin, Weiduo Liao, Zhenkun Wang, Qingfu Zhang, Xialiang Tong, and Mingxuan Yuan. Prompt learning for generalized vehicle routing. *IJCAI*, 2024
3. **Fei Liu**, Xi Lin, Qingfu Zhang, Xialiang Tong, and Mingxuan Yuan. Multi-task learning for routing problem with cross-problem zero-shot generalization. *SIGKDD*, 2024
4. **Fei Liu**, Qingfu Zhang, Qingling Zhu, Xialiang Tong, and Mingxuan Yuan. Machine learning assisted multi-objective evolutionary algorithm for routing and packing. *IEEE Transactions on Evolutionary Computation*, 2024
5. **Fei Liu**, Xialiang Tong, Mingxuan Yuan, and Qingfu Zhang. Algorithm evolution using large language model. *arXiv preprint arXiv:2311.15249*, 2023
6. **Fei Liu**, Xi Lin, Zhenkun Wang, Shunyu Yao, Xialiang Tong, Mingxuan Yuan, and Qingfu Zhang. Large language model for multi-objective evolutionary optimization. *arXiv preprint arXiv:2310.12541*, 2023
7. **Fei Liu**, Chengyu Lu, Lin Gui, Qingfu Zhang, Xialiang Tong, and Mingxuan Yuan. Heuristics for vehicle routing problem: A survey and recent advances. *arXiv preprint arXiv:2303.04147*, 2023
8. **Fei Liu** and Qingfu Zhang. A two-stage algorithm for integer multiobjective simulation optimization. In *International Conference on Evolutionary Multi-Criterion Optimization*, pages 17–28. Springer, 2023
9. **Fei Liu**, Qingfu Zhang, and Zhonghua Han. Moea/d with gradient-enhanced kriging for expensive multiobjective optimization. *Natural Computing*, 22(2):329–339, 2023
10. **Fei Liu**, Zhong-Hua Han, Yang Zhang, Ke Song, Wen-Ping Song, Feng Gui, and Ji-Bin Tang. Surrogate-based aerodynamic shape optimization of hypersonic flows considering transonic performance. *Aerospace Science and Technology*, 93:105345, 2019
11. **Fei Liu**, Xi Lin, Zhenkun Wang, Qingfu Zhang, Tong Xialiang, and Mingxuan Yuan. Multi-task learning for routing problem with zero-shot generalization. *NIPS*, 2023, under revision
12. Yiming Yao, **Fei Liu**, Ji Cheng, and Qingfu Zhang. Evolve cost-aware acquisition functions using large language models. *PPSN*, 2024
13. Bo Xue, Ji Cheng, **Fei Liu**, Yimu Wang, and Qingfu Zhang. Multiobjective lipschitz bandits under lexicographic ordering. In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 38, pages 16238–16246, 2024
14. Xi Lin, Xiaoyuan Zhang, Zhiyuan Yang, **Fei Liu**, Zhenkun Wang, and Qingfu Zhang. Smooth tchebycheff scalarization for multi-objective optimization. *ICML*, 2024
15. Fu Luo, Xi Lin, **Fei Liu**, Qingfu Zhang, and Zhenkun Wang. Neural combinatorial optimization with heavy decoder: Toward large scale generalization. *Advances in Neural Information Processing Systems*, 36, 2024
16. Ping Guo, **Fei Liu**, Xi Lin, Qingchuan Zhao, and Qingfu Zhang. L-autoda: Leveraging large language models for automated decision-based adversarial attacks. *GECCO*, 2024
17. Yiwen Wang, **Fei Liu**, and Qingfu Zhang. A decomposition-based hybrid algorithm for multi-objective vehicle routing problem with time windows. *IEEE Congress on Evolutionary Computation*, 2023
18. Zhonghua Han, **Fei Liu**, Chengzhou Xu, Keshi Zhang, and Qingfu Zhang. Efficient multi-objective evolutionary algorithm for constrained global optimization of expensive functions. *IEEE Congress on Evolutionary Computation*, 2019

19. Bei Liu, Hua Liang, Zhonghua Han, Yinghong Li, **Fei Liu**, Jiangbo Chi, and Zhiwen Ding. Numerical research on airfoil transition delay by alternative current dielectric barrier discharge actuation. *Chinese Journal of Aeronautics*, 2019

20. Sun Xiangcheng, Han Zhonghua, and **Fei Liu**. Design and analysis of hypersonic vehicel airfoil/wing at wide-range mach number. *Acta Aeronautica et Astronautica Sinica*, 39(6):31–42, 2018

21. Yang Zhang, Zhong-Hua Han, **Fei Liu**, and Chen-Zhou Xu. Aerodynamic design optimization of hypersonic wing over wide mach-number range considering lift matching. In *32nd Congress of the International Council of the Aeronautic Sciences, ICAS Paper*, volume 476, page 2021, 2020

**Patent**

1. A wide-mach-number-range symmetric airfoil with high lift-curve slope and its design method. *Patent*: ZL 201811319147.1, 2019

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