# Mengyuan Wang, Ph.D.

## Education

2017 - 2023	<b>Ph.D. in Aeronautics and Astronautics, University of Washington.</b> Dissertation: Optimal control for electrically propelled aircraft and urban air mobility network.
2020 – 2022	M.S. in Applied Mathematics, University of Washington.
2014 – 2017	<b>M.S. in Control Science and Engineering, Beihang University.</b> Thesis: An adaptive and robust filtering algorithm for Attitude and Heading Reference Systems.
2010 – 2014	<b>B.S. in Automation, Beihang University.</b> Thesis: Low-cost Attitude and Heading Reference Systems.

# **Publications**

### **Journal Articles**

**M. Wang** and M. Mesbahi, "To charge in-flight or not: A comparison of two parallel-hybrid electric aircraft configurations via optimal control," *IEEE Transactions on Transportation Electrification*, 2023.

Y. Yu, **M. Wang**, M. Mesbahi, and U. Topcu, "Vertiport selection in hybrid air-ground transportation networks via mathematical programs with equilibrium constraints," *IEEE Transactions on Control of Network Systems*, 2023.

**M. Wang**, S. Kolluri, K. Shah, V. R. Subramanian, and M. Mesbahi, "Energy management for an all-electric aircraft via optimal control," *IEEE Transactions on Aerospace and Electronic Systems*, vol. 59, no. 2, pp. 1084–1095, 2022.

N. Gao, **M. Wang**, and L. Zhao, "A novel robust kalman filter on AHRS in the magnetic distortion environment," *Advances in Space Research*, vol. 60, no. 12, pp. 2630–2636, 2017.

### **Conference Proceedings**

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**M. Wang** and M. Mesbahi, "Power allocation for hybrid electric aircraft via optimal control during climb, cruise, and descent," in *AIAA Scitech 2021 Forum*, 2021, p. 0640.

**M. Wang** and M. Mesbahi, "Energy management for electric aircraft via optimal control: Cruise phase," in *2020 AIAA/IEEE Electric Aircraft Technologies Symposium (EATS)*, IEEE, 2020, pp. 1–15.

N. Gao, **M. Wang**, and L. Zhao, "An integrated ins/gnss urban navigation system based on fuzzy adaptive kalman filter," in *2016 35th Chinese Control Conference (CCC)*, IEEE, 2016, pp. 5732–5736.

# **Selected Research Experiences**

**Trajectory optimization for All-Electric Aircraft** 

Jul 2018 - Aug 2020

- Integrated battery and flight dynamics into a trajectory optimization algorithm for an All-Electric Aircraft to minimize operating costs.
- Examined the algorithm in the context of Pontryagin's Minimum Principle, provided necessary optimality conditions for the proposed integrated approach.
- Built a Matlab/Simulink model to verify the algorithm with a physical-based battery model.

# Selected Research Experiences (continued)

#### Hybrid-Electric Aircraft: To charge or not to charge

- Designed a power allocation algorithm to optimally determine the power distribution in the propulsion system for a given flight condition.
- · Compared two parallel hybrid-electric propulsion architectures-one with and one without mechanical connection between the engines and the electric motors-using the power allocation algorithm.
- · Conducted sensitivity analysis of the fuel consumption on the initial aircraft weight and flight endurance; concluded that the benefits of charging the battery during flight are limited for the 19-seat aircraft model.
- Built a Matlab/Simulink model to verify the power allocation algorithm and conduct the architectural comparison.

#### Network design in Urban Air Mobility

- Developed a linear-program-based model for static traffic equilibria in a hybrid air-ground transportation network.
- Proposed a mathematical program with bilinear equilibrium constraints that optimizes vertiport location and capacity within budget and logical constraints.
- **Task assignment and vehicle routing in Urban Air Mobility** Jan 2023 - Present
  - Developed a task assignment and vehicle routing algorithm addressing critical questions in UAM, such as determining the requisite number of vehicles to meet daily air travel demands.
  - Transformed the task assignment problem into finding multiple non-intersecting paths that maximize profits; each resulting path serves as a routing solution for a vehicle.
  - Results published in my dissertation.

### **Teaching Experiences**

**Instructor,** UW AE514 Estimation theory, graduate course. 2022

**Co-Instructor,** UW AE513 Multivariable Control, graduate course. 2021

### Miscellaneous Experiences

#### Awards and Achievements

- A&A Student Excellence Award for Teaching, UW. 2021
- Excellent Graduate of Class, Beihang University. 2017
- First Class Scholarship for Outstanding Students. 2014
  - Excellent Graduate of Class, Beihang University.
- China Aerospace Science and Technology Corp. (CASC) Scholarship. 2013

#### Services

- Senator, UW the Graduate and Professional Student Senate. 2021-2023
- Member, UW Women of Aerospace. 2018-2021

Jul 2018 - Jun 2022

Jun 2021 - Jan 2023