

The University of Sydney
School of Civil Engineering
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Education

- PhD in Civil Engineering, Minor in Aerospace Engineering, 2020
University of Minnesota-Twin Cities; Minneapolis, Minnesota, USA
- BS in Mechanical Engineering, 2012
Rice University, Houston, Texas, USA

Professional Appointments

- Lecturer, School of Civil Engineering, The University of Sydney, 2023 – current
- Postdoctoral fellow, Department of Atmospheric and Oceanic Sciences, University of California in Los Angeles, 2020 – 2023
- Graduate student researcher, St Anthony Falls Laboratory, University of Minnesota-Twin Cities, 2015 – 2020
- Mechanical engineer, CH2M Hill, 2012 – 2015

Teaching Units

- CIVL5670 Reservoir, Stream and Coastal Engineering
- CIVL6002 Measurement and Data in Civil Engineering

Sponsored Research

- Arjomandi M, Monty J, Steinberg T, Cholette M, Chauhan K, Emes M, Jafari A, Marusic I, Westra S, Hutchins N, Tucker M, **Heisel M**, and G Picotti. *Facilities for Atmospheric Boundary Layer Evaluation and Testing*. ARC LIEF (Australian Research Council Linkage Infrastructure, Equipment and Facilities). AU\$1,200,000. 2024.
- **Heisel M**. *The building blocks of shear-driven atmospheric turbulence*. NSF-AGS-PRF-2031312 (US National Science Foundation Division of Atmospheric and Geospace Sciences postdoctoral research fellowship). US\$190,000. 2020 – 2022.

Journal Publications

20. Buono E, Katul GG, **Heisel M**, Vettori D, Poggi D, Peruzzi C, and C Manes (2024). The vertical-velocity skewness in the inertial sublayer of turbulent wall flows. *Journal of Fluid Mechanics*, 1001, R1. DOI: 10.1017/jfm.2024.975.
19. Buono E, Katul GG, **Heisel M**, Poggi D, Peruzzi C, Vettori D, and C Manes (2024). The vertical-velocity skewness in the atmospheric boundary layer without buoyancy and Coriolis effects. *Physics of Fluids*, 36(11), 115153. DOI: 10.1063/5.0235007.

18. Ehsani R, **Heisel M**, Puccioni M, Hong J, Iungo V, Voller V, and M Guala (2024). Stochastic modal velocity field in rough-wall turbulence. *Journal of Fluid Mechanics*, 999, A56. DOI: 10.1017/jfm.2024.933.
17. **Heisel M** and M Chamecki (2024). On the departure from Monin–Obukhov surface similarity and transition to the convective mixed layer. *Boundary-Layer Meteorology*, 190, 28. DOI: 10.1007/s10546-024-00870-0.
16. Ehsani R, **Heisel M**, Li J, Voller VR, Hong J, and M Guala (2024). Stochastic modelling of the instantaneous velocity profile in rough-wall turbulent boundary layers. *Journal of Fluid Mechanics*, 979, A12. DOI: 10.1017/jfm.2023.999.
15. **Heisel M** and M Chamecki (2023). Evidence of mixed scaling for mean profile similarity in the stable atmospheric surface layer. *Journal of the Atmospheric Sciences* 80(8), 2057-2073. DOI: 10.1175/JAS-D-22-0260.1.
14. **Heisel M**, Sullivan PP, Katul GG, and M Chamecki (2023). Turbulence organization and mean profile shapes in the stably stratified boundary layer: zones of uniform momentum and air temperature. *Boundary-Layer Meteorology* 186, 533-565. DOI: 10.1007/s10546-022-00771-0.
13. **Heisel M**, de Silva CM, Katul GG, and M Chamecki (2022). Self-similar geometries within the inertial subrange of scales in boundary layer turbulence. *Journal of Fluid Mechanics*, 942, A33. DOI: 10.1017/jfm.2022.409.
12. **Heisel M** (2022). Effect of finite Reynolds number on self-similar crossing statistics and fractal measurements in turbulence. *Physical Review Fluids* 7(1), 014604. DOI: 10.1103/PhysRevFluids.7.014604.
11. **Heisel M**, Chen B, Kok J, and M Chamecki (2021). Gentle topography increases vertical transport of coarse dust by orders of magnitude. *Journal of Geophysical Research*, 126(14), e2021JD034564. DOI: 10.1029/2021JD034564.
10. **Heisel M**, de Silva CM, Hutchins N, Marusic I, and M Guala (2021). Prograde vortices, internal shear layers, and the Taylor microscale in high-Reynolds-number wall turbulence. *Journal of Fluid Mechanics*, 920, A52. DOI: 10.1017/jfm.2021.478.
9. Li C, Lim K, Berk T, Abraham A, **Heisel M**, Guala M, Coletti F, and Hong J (2021). Settling and clustering of snow particles in atmospheric turbulence. *Journal of Fluid Mechanics*, 912, A49. DOI: 10.1017/jfm.2020.1153.
8. **Heisel M**, Katul G, Chamecki M, and M Guala (2020). Velocity asymmetry and turbulent transport closure in smooth- and rough-wall boundary layers. *Physical Review Fluids*, 5(10), 104605. DOI: 10.1103/PhysRevFluids.5.104605.
7. **Heisel M**, Daugherty C, Finley N, Linderman L, Schillinger D, French C, and M Guala (2020). Aerodynamics of highway sign structures: from laboratory tests and field monitoring to structural design guidelines. *Journal of Structural Engineering*, 146(11), 04020233. DOI: 10.1061/(ASCE)ST.1943-541X.0002798.
6. Guala M, **Heisel M**, Singh A, Musa M, Buscombe D, and P Grams (2020). A mixed length scale model for migrating fluvial bedforms. *Geophysical Research Letters*, 47(15), 2019GL086625. DOI: 10.1029/2019GL086625.
5. Zhu Q, Stoter SKF, **Heisel M**, French CE, Guala M, Linderman L, and D Schillinger (2020). Reducing wind-induced vibrations of road sign structures through aerodynamic modifications: a computational pilot study for a practical example. *Journal of Wind Engineering and Industrial Aerodynamics*, 188, 104132. DOI: 10.1016/j.jweia.2020.104132.
4. **Heisel M**, de Silva CM, Hutchins N, Marusic I, and M Guala (2020). On the mixing length eddies and logarithmic mean velocity profile in wall turbulence. *Journal of Fluid Mechanics*, 887, R1. DOI: 10.1017/jfm.2020.23.

3. **Heisel M**, Dasari T, Liu Y, Hong J, Coletti F, and M Guala (2018). The spatial structure of the logarithmic region in very-high-Reynolds-number rough wall turbulent boundary layers. *Journal of Fluid Mechanics*, 857, 704-747. DOI: 10.1017/jfm.2018.759.
2. **Heisel M**, Hong J, and M Guala (2018). The spectral signature of wind turbine wake meandering: a wind tunnel and field-scale study. *Wind Energy* 21(9), 715-731. DOI: 10.1002/we.2189.
1. Musa M, **Heisel M**, and M Guala (2018). Predictive model for local scour downstream of hydrokinetic turbines in erodible channels. *Physical Review Fluids* 3(2), 024606. DOI: 10.1103/PhysRevFluids.3.024606.

Conference Proceedings

1. **Heisel M**, Dasari T, Petersen A, Liu Y, Hong J, Coletti F, and M Guala (2018). Characterizing turbulent structures in the atmospheric boundary layer with super-large-scale particle image velocimetry. *19th International Symposium on Applications of Laser and Imaging Techniques to Fluid Mechanics*; July 2018; Lisbon, Portugal.

Seminar Presentations

5. “A new perspective on similarity in the atmospheric boundary layer,” Australasian Fluid Mechanics Society seminar series, September 2024.
4. “A new perspective on mean flow similarity in the atmospheric boundary layer,” Fluid Mechanics Research Group, University of Melbourne, October 2023.
3. “Turbulent flow structure and mean profile similarity in the stably stratified atmospheric boundary layer,” Fluid Dynamics Group (AMME), University of Sydney, March 2023.
2. “Persistent shapes in boundary layer turbulence,” Department of Civil and Environmental Engineering, Duke University, November 2022.
1. “Building blocks of boundary layer turbulence,” Department of Atmospheric & Oceanic Sciences (AOS 271), University of California in Los Angeles, May 2022.

Service Activities

- Director of Outreach, School of Civil Engineering, University of Sydney, 2024 – present.
- Associate Editor, *ARC Geophysical Research*, 2024 – present.
- Journal manuscript referee: *Boundary-Layer Meteorology*; *Experiments in Fluids*; *Fluids*; *International Journal of Heat and Fluid Flow*; *Journal of the Atmospheric Sciences*; *Journal of Fluid Mechanics* (more than 10); *Quarterly Journal of the Royal Meteorological Society*
- Funding proposal assessor: US Army Research Office; US National Science Foundation (CAREER and project)

Awards

- Doctoral Dissertation Fellowship, University of Minnesota-Twin Cities, 2019 – 2020
- International Thesis Research Travel Grant, University of Minnesota-Twin Cities, 2019
- Edward Silberman Fellowship, University of Minnesota-Twin Cities, 2017
- Johnson Fellowship, University of Minnesota-Twin Cities, 2015 – 2016