

Claudia E. Brunner, PhD

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Education

Princeton University

May 2022 PhD in Mechanical and Aerospace Engineering
Dissertation: Unsteady aerodynamics with applications for wind turbines

Certificate in Science, Technology and Environmental Policy
from the School of Public and International Affairs

2019 M.A. Mechanical and Aerospace Engineering

Stanford University

2017 B.S. Mechanical Engineering
B.A. International Relations

Research experience

Max Planck Institute for Dynamics and Self-Organization

08/22 - present *Postdoctoral researcher* in the laboratory of Prof. Eberhard Bodenschatz

- conducting experiments in a pressurized wind tunnel to investigate wind turbine wakes and turbine-turbine interactions at high Reynolds numbers

Princeton University

2017 – 2022 *Graduate research assistant*, advised by Prof. Marcus Hultmark

- conducted unsteady airfoil experiments in a pressurized wind tunnel to investigate dynamic stall at high Reynolds numbers and its impact on vertical axis wind turbines in collaboration with Prof. Martin O. L. Hansen
- designed and deployed a data acquisition platform for hot-wire measurements in the atmospheric surface layer as part of a multi-university field campaign led by Prof. Eric Pardyjak

2019 – 2022 *Environmental policy fellow*, advised by Prof. Alex Glaser

- study the role of offshore wind energy in decarbonizing the electricity sector using the integrated assessment model WITCH

Stanford University

Summer 2016 *Undergraduate research assistant*, advised by Prof. John Dabiri

- designed an experiment to study the motions of tree branches in wind using image analysis software

Summer 2016 *Undergraduate research fellow*, TomKat Center for Sustainable Energy

- assessed the potential for under-resourced California schools to reduce electricity bills by using state grants to install solar PV systems

Honors & awards

	Max Planck Society
2022	Minerva Fast Track Fellowship
	United States Department of Defense
2018	National Defense Science and Engineering Graduate Fellowship
	Princeton University
2019	High Meadows Environmental Institute - Science, Technology and Environmental Policy Fellowship
	Princeton Energy and Climate Scholars
2017	Upton First-Year Fellowship in Engineering
	Stanford University
2016	Public Service Honor Society
	TomKat Energy Impact Fellowship
	Woods Institute Forum for Undergraduate Environmental Leadership
2015	Haas African Service Fellowship

Peer-reviewed publications

C E Brunner, J Kiefer and M Hultmark (2022). “Comparison of dynamic stall on an airfoil undergoing sinusoidal and VAWT-shaped pitch motions” *J. Phys.: Conf. Ser.* 2265: 032006 DOI:10.1088/1742-6596/2265/3/032006

J Kiefer, **C E Brunner**, M O L Hansen and M Hultmark (2022). “Dynamic stall at high Reynolds numbers induced by ramp-type pitching motions” *J. Fluid Mech.* 938: A10. DOI:10.1017/jfm.2022.70

C E Brunner, J Kiefer, M O L Hansen and M Hultmark (2021). “Study of Reynolds number effects on the aerodynamics of a moderately thick airfoil using a high-pressure wind tunnel” *Exp. Fluids* 62: 178. DOI:10.1007/s00348-021-03267-8

K Y Huang, **C E Brunner**, M K Fu, K Kokmanian, T Morrison, A O Perelet, M Calaf, E Pardyjak and M Hultmark (2021). “Investigation of the atmospheric surface layer using novel high-resolution sensors” *Exp. Fluids* 62: 76. DOI:10.1007/s00348-021-03173-z

C E Brunner, J Kiefer, M O L Hansen and M Hultmark (2020). “Unsteady effects on a pitching airfoil at conditions relevant for large vertical axis wind turbines” *J. Phys.: Conf. Ser.* 1618: 052065. DOI:10.1088/1742-6596/1618/5/052065

J Kiefer, **C E Brunner**, M Hultmark and M O L Hansen (2020). “Dynamic stall at high Reynolds numbers due to variant types of airfoil motion” *J. Phys.: Conf. Ser.* 1618: 052028. DOI:10.1088/1742-6596/1618/5/052028

Teaching experience

	Department of Mechanical and Aerospace Engineering, Princeton University
Spring 2020	Integrated Engineering Science Laboratory - Fluid Mechanics <i>Graduate teaching assistant</i> <ul style="list-style-type: none">• taught a weekly three-hour lab session• prepared and delivered an hour-long lecture on airfoil aerodynamics• graded written lab reports and mentored students for their final project
Fall 2019	Integrated Engineering Science Laboratory - Thermodynamics <i>Graduate teaching assistant</i> <ul style="list-style-type: none">• taught a weekly three-hour lab session• created a Github laboratory manual for a heat engine experiment• graded written lab reports and mentored students on their final project
Spring 2019	Mechanics of Fluids <i>Graduate teaching assistant</i> <ul style="list-style-type: none">• prepared and taught a weekly hour-long problem session• provided individual homework assistance and graded homework and exams
	McGraw Center for Teaching and Learning, Princeton University
2019 – 2021	Undergraduate Tutoring Program <i>Graduate coordinator</i> <ul style="list-style-type: none">• oversaw Princeton's undergraduate tutoring program two nights per week with up to 50 tutors and up to 100 students• assisted in interviewing, hiring, training and mentoring undergraduate tutors

Mentoring experience

	Princeton University
2021	<i>Mentor</i> of two undergraduate students for their senior thesis "Sensor-integrated unmanned aerial vehicle: A pilot design for albedo monitoring" <i>Guest speaker</i> , Research Q&A Series, Undergraduate Environmental Scholars Program

Conference presentations

2022	Comparison of dynamic stall on an airfoil undergoing sinusoidal and VAWT-shaped pitch motions. The Science of Making Torque from Wind (TORQUE) Dynamic stall at high Reynolds numbers. Direct In-person Colloquium on Vortex Dominated Flows
2021	On the timescales of dynamic stall. 74th Annual Meeting of the APS Division of Fluid Dynamics

- Reduced frequency effects on dynamic stall at high Reynolds numbers. 2nd Annual National Defense Science and Engineering Graduate Fellowship Conference
- 2020 Dynamic stall on an airfoil pitching at very high amplitudes and Reynolds numbers. 73rd Annual Meeting of the APS Division of Fluid Dynamics
- Unsteady effects on a pitching airfoil at conditions relevant for large vertical axis wind turbines. The Science of Making Torque from Wind (TORQUE)
- 2019 Dynamic stall experiments on a sinusoidally pitching airfoil at high Reynolds numbers. 72nd Annual Meeting of the APS Division of Fluid Dynamics
- Unsteady airfoils at high Reynolds numbers. Thousand Islands Fluid Dynamics Meeting
- 2018 High-frequency simultaneous temperature and velocity measurements in the atmospheric surface layer. American Geophysical Union Fall Meeting
- Dynamic effects on airfoil performance under unsteady inflow conditions at high Reynolds numbers. 71st Annual Meeting of the APS Division of Fluid Dynamics

Seminars and invited talks

- 2022 The unsteady aerodynamics of wind power generation. Department of Mechanical Engineering, **University of British Columbia**
- Unsteady aerodynamics with applications for vertical axis wind turbines. Laboratory for Fluid Physics, Pattern Formation and Biocomplexity, **Max Planck Institute for Dynamics and Self-Organization**
- The role of onshore and offshore wind energy in the United States in future energy scenarios. Science, Technology and Environmental Policy PhD Seminar, **School of Public and International Affairs**, Princeton University
- The unsteady aerodynamics of wind power generation. Mechanical Engineering and Applied Mechanics, **University of Pennsylvania**
- 2021 Offshore wind energy in the United States – from burgeoning technology to competitive market force? **Princeton Energy and Climate Scholars Seminar**
- Offshore wind energy in the United States – from burgeoning technology to competitive market force? Science, Technology and Environmental Policy PhD Seminar, **School of Public and International Affairs**, Princeton University
- 2020 Unsteady airfoil experiments relevant for vertical axis wind turbines. **Princeton Energy and Climate Scholars Seminar**
- 2019 Studying large wind turbines using small-scale models. **Andlinger Center for Energy and the Environment** meeting with the New Jersey Governor's Office, Princeton University

Service

- 2022 - present **Topical Group on the Physics of Climate**, American Physical Society
Executive Committee Student Member-at-Large
- 2020 - 2021 **Princeton Energy and Climate Scholars**, Princeton University
Student chair
- 2019 - 2020 **Graduate Student Council**, Department of Mechanical and Aerospace Engineering, Princeton University
Sustainability representative

Outreach

- 2021 *Guest lecturer*, “International Climate Policy”
Facilitator, “World Climate Simulation”
Princeton Day School
- Panelist*, High School Engineering Colloquium
 Society of Women Engineers, Princeton Chapter
- 2020 *Guest lecturer*, “Environmental Justice and the Dakota Access Pipeline”
Princeton Day School
- 2019 *Guest lecturer*, “Introduction to Climate Science”
Princeton Day School

Professional development

- 2023 **Sign Up! Career Building Program**
Series of professional development workshops hosted by the Max Planck Society
- January 2022 **Financial Markets for Policy Professionals**
Intensive course at Julis-Rabinowitz Center, Princeton University
- October 2021 **Rising Stars in Mechanical Engineering**
Career workshop at Massachusetts Institute of Technology
- Fall 2020 **Inclusive Leadership Learning Cohort**
Semester-long course at GradFutures, Princeton University
- Winter 2016 **Public Service Leadership Program**
Ten-week course at Haas Center for Public Service, Stanford University

Professional memberships

- American Physical Society (APS)
American Geophysical Union (AGU)