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

Jan 2019 — M.A. Mechanical and Aerospace Engineering

Stanford University

Jun 2017 — B.S. Mechanical Engineering

B.A. International Relations

Research experience

Max Planck Institute for Dynamics and Self-Organization

Jan 23 - present — *Group leader* of a Minerva Fast Track Group hosted by Prof. Eberhard Bodenschatz
Topic: Turbulence and Wind Energy

Aug 22 - Dec 22 — *Postdoctoral researcher* supervised by Prof. Eberhard Bodenschatz
Topic: Lagrangian particle tracking of turbulence in a wind turbine wake using the Variable Density Turbulence Tunnel

Princeton University

Sep 17 - May 22 — *Graduate research assistant* advised by Prof. Marcus Hultmark
Topics: Unsteady airfoil experiments in the High Reynolds number Test Facility to investigate dynamic stall and its impact on vertical axis wind turbines

Nanoscale hot-wire measurements in the atmospheric surface layer

Sep 19 - May 22 — *Environmental policy fellow* advised by Prof. Alex Glaser
Topic: Investigating the role of wind energy in future energy scenarios using the integrated assessment model WITCH

Stanford University

Jun 16 - Sep 16 — *Undergraduate research assistant* advised by Prof. John Dabiri
Topic: Using image analysis to quantify the motions of tree branches in wind

Jun 16 - Sep 16 — *Undergraduate research fellow* at the TomKat Center for Sustainable Energy
Topic: The potential for under-resourced California schools to reduce electricity bills using state grants to install solar PV systems

Fellowships & Grants

2022	**Minerva Fast Track Position** (∼700k€) Max Planck Society
	Walter Benjamin Position (∼115k€, declined) German Research Foundation
2019	**Science, Technology and Environmental Policy Fellowship** (∼$91k) High Meadows Environmental Institute, Princeton University
2018	**National Defense Science and Engineering Graduate Fellowship** (∼$272k) United States Department of Defense
2017	**Upton First-Year Fellowship in Engineering** (∼$105k) School of Engineering and Applied Science, Princeton University

Honors & awards

2019	**Princeton Energy and Climate Scholars** High Meadows Environmental Institute, Princeton University
2016	**Public Service Honor Society** Haas Center for Public Service, Stanford University
	Forum for Undergraduate Environmental Leadership Woods Institute for the Environment, Stanford University

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

Seminars and invited talks

2022 **University of British Columbia**, Department of Mechanical Engineering
The unsteady aerodynamics of wind power generation

Max Planck Institute for Dynamics and Self-Organization, Laboratory for Fluid Physics, Pattern Formation and Biocomplexity
Unsteady aerodynamics with applications for vertical axis wind turbines

Princeton University, School of Public and International Affairs (PhD Seminar)
The role of onshore and offshore wind energy in the United States in future energy scenarios

University of Pennsylvania, Dept. of Mechanical Engineering and Applied Mechanics
The unsteady aerodynamics of wind power generation

2021 **Princeton University**, Princeton Energy and Climate Scholars Seminar
Offshore wind energy in the United States – from burgeoning technology to competitive market force?

Princeton University, School of Public and International Affairs (PhD Seminar)
Offshore wind energy in the United States – from burgeoning technology to competitive market force?

2020 **Princeton University**, Princeton Energy and Climate Scholars Seminar
Unsteady airfoil experiments relevant for vertical axis wind turbines

2019 **Princeton University**, Andlinger Center for Energy and the Environment (meeting with the New Jersey Governor's office)
Studying large wind turbines using small-scale models

Teaching experience

Department of Mechanical and Aerospace Engineering, Princeton University

Spring 2020 **Integrated Engineering Science Laboratory - Fluid Mechanics**
Graduate teaching assistant

- 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**
Graduate teaching assistant

- 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**

Graduate teaching assistant

- 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

Mar 19 - May 21 **Undergraduate Tutoring Program**

Graduate coordinator

- 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

Conference presentations

2022 **75th Annual Meeting of the APS Division of Fluid Dynamics**
High Reynolds number wind turbine experiments in the Variable Density Turbulence Tunnel

The Science of Making Torque from Wind (TORQUE)
Comparison of dynamic stall on an airfoil undergoing sinusoidal and VAWT-shaped pitch motions

Direct In-person Colloquium on Vortex Dominated Flows
Dynamic stall at high Reynolds numbers

2021 **74th Annual Meeting of the APS Division of Fluid Dynamics**
On the timescales of dynamic stall

2nd Annual NDSEG Fellowship Conference
Reduced frequency effects on dynamic stall at high Reynolds numbers

2020 **73rd Annual Meeting of the APS Division of Fluid Dynamics**
Dynamic stall on an airfoil pitching at very high amplitudes and Reynolds numbers

The Science of Making Torque from Wind (TORQUE)
Unsteady effects on a pitching airfoil at conditions relevant for large vertical axis wind turbines

2019 **72nd Annual Meeting of the APS Division of Fluid Dynamics**
Dynamic stall experiments on a sinusoidally pitching airfoil at high Reynolds numbers

Thousand Islands Fluid Dynamics Meeting
Unsteady airfoils at high Reynolds numbers

2018 **American Geophysical Union Fall Meeting**
High-frequency simultaneous temperature and velocity measurements in the atmospheric surface layer

71st Annual Meeting of the APS Division of Fluid Dynamics
Dynamic effects on airfoil performance under unsteady inflow conditions at high Reynolds numbers

Service

Jan 22 - present	**Topical Group on the Physics of Climate**, American Physical Society *Executive Committee Student Member-at-Large*
Aug 20 - Jul 21	**Princeton Energy and Climate Scholars**, Princeton University *Student chair*
Sep 19 - May 20	**Graduate Student Council**, Department of Mechanical and Aerospace Engineering, Princeton University *Sustainability representative*

Mentoring experience

	Princeton University
Spring 2021	*Mentor* of two undergraduate students for their senior thesis "Sensor-integrated unmanned aerial vehicle: A pilot design for albedo monitoring"

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

Jan 23 - Dec 23	**Sign Up! Career Building Program** Series of professional development workshops hosted by the Max Planck Society
Jan 22	**Financial Markets for Policy Professionals** Intensive course at Julis-Rabinowitz Center, Princeton University
Oct 21	**Rising Stars in Mechanical Engineering** Career workshop at Massachusetts Institute of Technology
Sep 20 - Dec 20	**Inclusive Leadership Learning Cohort** Semester-long course at GradFutures, Princeton University
Jan 16 - Mar 16	**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)