

# Lucia Stein-Montalvo

## Curriculum Vitae

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### EDUCATION & PROFESSIONAL EXPERIENCE

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<b>Presidential Postdoctoral Research Fellow, Princeton University</b> <i>Civil &amp; Environmental Engineering. Advisors: Elie Bou-Zeid &amp; Sigrid Adriaenssens</i>	Princeton, NJ, USA <i>Sept 2021–Present</i>
<b>Ph.D. in Mechanical Engineering, Boston University</b> <i>Thesis: “Shape-shifting and instabilities in plates and shells”. Advisor: Douglas P. Holmes</i>	Boston, MA, USA <i>May 2021</i>
<b>Visiting Researcher, Université Grenoble Alpes</b> <i>Laboratoire Interdisciplinaire de Physique. Advisors: Gwennou Coupier &amp; Catherine Quilliet</i>	Grenoble, France <i>Jan–June 2019</i>
<b>M.S. in Mechanical Engineering, Boston University</b> <i>Advisor: Douglas P. Holmes</i>	Boston, MA, USA <i>Dec 2019</i>
<b>Research Assistant, University of North Carolina</b> <i>Geological Sciences. Advisor: Jose Rial</i>	Chapel Hill, NC, USA <i>May–Aug 2014; Dec–May 2016</i>
<b>B.S. in Mathematics, Davidson College</b> <i>Minor: Hispanic Studies. Advisor: Raghuram Ramanujan</i>	Davidson, NC, USA <i>May 2015</i>

### AWARDS & HONORS

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<b>Creative-X Grant, Princeton University</b> <i>“Swarm Garden”: Nature-inspired architecture exhibit based on confined buckling (\$10,000); Collaborator</i>	<i>August 2023</i>
<b>Innovation Grant, Princeton University</b> <i>“Kirigami tailors airflow and shade in public, outdoor spaces.” \$110,000; Co-PI</i>	<i>April 2023</i>
<b>Mistletoe Research Fellowship, Momental Foundation</b> <i>Awarded the Unfettered Research Grant (\$10,000), and participation in the MRF Startup Collaboration</i>	<i>October 2022</i>
<b>Maître de Conférences (lecturer) qualification, French National Council of Universities</b> <i>Section 60: Mécanique, génie mécanique, génie civil (mechanics, mechanical &amp; civil engineering)</i>	<i>February 2022</i>
<b>Presidential Postdoctoral Research Fellowship, Princeton University</b> <i>Awarded 2 years of postdoctoral funding to study “Shape-shifting for architecture &amp; urban environments”</i>	<i>January 2021</i>
<b>Rising Stars in Mechanical Engineering</b> <i>Academic career workshop held at Stanford for women in mechanical engineering</i>	<i>October 2019</i>
<b>Distinguished Mechanical Engineering Fellowship, Boston University</b> <i>Awarded 1 year of funding</i>	<i>September 2016</i>

### TEACHING

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<b>Guest Lecturer, Princeton University Civil and Environmental Engineering</b> – Mechanics of Solids (Instructor: S. Adriaenssens)	<i>Fall 2022</i>
<b>Graduate Teaching Fellow, Boston University Mechanical Engineering</b> – Mechanics of Materials (Instructor: J.G. McDaniel)	<i>Summer 2020</i>
– Introduction to CAD (Instructor: P.A. Zink)	<i>Fall 2019</i>
– Mechanics of Materials (Instructor: D.P. Holmes)	<i>Fall 2017</i>
– Introduction to Fluid Mechanics (Instructors: J.C. Bird and K.A. Brown)	<i>Fall 2016</i>
<b>Coursework Development</b> – Mechanics of Materials remote learning labs <i>Developed &amp; implemented four hands-on labs in Jupyter, which are in continued use.</i>	<i>Summer 2020</i>

## MENTORING & OUTREACH

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### Mentoring

- Undergraduate in CEE, Princeton University: large-scale kirigami shading structures *Sept 2022–May 2023*
- PhD student in CEE, Princeton University: deployable kirigami structures *Sept 2021–Present*
- Undergraduate in ME, Boston University: buckling of confined plates *2019–2020*
- High school student, RISE Program at Boston University: residual swelling & shells *2017–2018*
- Undergraduate in ME, Boston University: residual swelling & curvature *2017–2018*

### Outreach & Science Communication

- Swarm Garden exhibition: Interactive buckling of confined sheets, Princeton University *Scheduled: April 2024*
- Selected entry for Art of Science Exhibition, Princeton University *April 2023*
- Yoga Instructor, Graduate Women in Science and Engineering (GWISE), Boston University *2016–2020*
- Annual participation in U-Design workshops for middle & high school students, Boston University *2016–2018*

## ACADEMIC SERVICE

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- Session chair: APS March Meeting *2022*
- Peer review: Journals including Nature Communications, Proceedings A, Physical Review E, & Physical Review Letters *2021–Present*

## LANGUAGES

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- English (native)
- Spanish (fluent)

## PUBLICATIONS

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- [1] **L. Stein-Montalvo**, L. Ding, M. Hultmark, S. Adriaenssens, and E. Bou-Zeid. Kirigami-inspired wind-steering for natural ventilation. *Journal of Wind Engineering and Industrial Aerodynamics* **246**, 105667 (2024) doi: 10.1016/j.jweia.2024.105667
- [2] **L. Stein-Montalvo**, A. Guerra, K. Almedia, O. Kodio, and D.P. Holmes. Wrinkling and developable cones in centrally confined sheets. *Physical Review E* **108**, 035002 (2023) doi: 10.1103/PhysRevE.108.035002
- [3] J. Flores, **L. Stein-Montalvo**, and S. Adriaenssens. Effect of crease curvature on the bistability of the origami waterbomb base. *Extreme Mechanics Letters* (2022) **Front cover**. doi: 10.1016/j.eml.2022.101909
- [4] **L. Stein-Montalvo**, J.H. Lee, Y. Yang, M. Landesberg, H.S. Park, and D.P. Holmes. Efficient snap-through of spherical caps by applying a localized curvature stimulus. *European Physical Journal E*, **45**, 3 (2022) doi: 10.1140/epje/s10189-021-00156-0
- [5] **L. Stein-Montalvo**, D.P. Holmes, and G. Coupier. Delayed buckling of spherical shells due to viscoelastic knockdown of the critical load. *Proc. R. Soc. A*, **477**: 20210253 (2021) doi: 10.1098/rspa.2021.0253
- [6] **L. Stein-Montalvo**, P. Costa, M. Pezulla, and D.P. Holmes. Buckling of geometrically confined shells. *Soft Matter*, **15**:1215–1222 (2019) **Front cover**. doi: 10.1039/c8sm02035c

### Publications in Preparation:

- [7] **L. Stein-Montalvo**, S. Adriaenssens, and E. Bou-Zeid. Kirigami for urban ventilation. *In preparation* (2024)
- [8] **L. Stein-Montalvo**, T. Tachi, and S. Adriaenssens. Self-folding and panel deformations of the origami curved-crease waterbomb base. *In preparation* (2024)
- [9] M. Alhafnawi, **L. Stein-Montalvo**, S. Adriaenssens, and R. Nagpal. Swarm garden: A human-responsive façade based on buckling of confined sheets. *In preparation* (2024)
- [10] **L. Stein-Montalvo**, A. Guerra, O. Kodio, and D.P. Holmes. Evolution of the stretching core in centrally confined sheets. *In preparation* (2024)

## TALKS & POSTERS

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- L. Stein-Montalvo**, “Shape-shifting: from fundamental mechanics to adaptable cities” at Civil and Environmental Engineering Department Seminar Series, Princeton University, Princeton, NJ, February 2024.
- L. Stein-Montalvo**, L. Ding, M. Hultmark, S. Adriaenssens, and E. Bou-Zeid “Kirigami for urban ventilation and shade” at Society of Engineering Science Technical Meeting, Minneapolis, MN, October 2023.
- L. Stein-Montalvo**, J. Flores, and S. Adriaenssens “Effect of crease curvature on structure and instabilities of the origami waterbomb base” at APS March Meeting, Las Vegas, NV, March 2023.
- L. Stein-Montalvo**, L. Ding, M. Hultmark, S. Adriaenssens, and E. Bou-Zeid “Kirigami-based design of wind-steering shading structures for urban ventilation” at AMS Annual Meeting, Denver, CO, January 2023.
- L. Stein-Montalvo**, J. Flores, and S. Adriaenssens “Structure and instabilities of the curved-crease origami waterbomb base” at Physics of Morphing Matter Workshop, Princeton, NJ, December 2023 (Poster).
- L. Stein-Montalvo**, L. Ding, M. Hultmark, S. Adriaenssens, and E. Bou-Zeid “Kirigami-inspired wind-steering for ventilation of urban shading structures” at APS DFD, Indianapolis, IA, November 2022.
- L. Stein-Montalvo**, A.D. Guerra, K. Almeida, O. Kodio, and D.P. Holmes “Wrinkles and developable cones in annular sheets” at APS March Meeting, Chicago, IL, March 2022.
- L. Stein-Montalvo** “Shape-shifting and instabilities of plates and shells”, invited seminar at P.T. Brun Lab, Princeton, NJ, October 2021.
- L. Stein-Montalvo**, A.D. Guerra, K. Almeida, O. Kodio, and D.P. Holmes “Circumferential buckling of the annular d-cone” at SMatCH (Soft Matter at Coffee Hour), Princeton, NJ, October 2021.
- L. Stein-Montalvo**, D.P. Holmes and G. Coupier. “Delayed pressure buckling of viscoelastic spherical shells” at APS March Meeting, Virtual, March 2021.
- L. Stein-Montalvo** “Interfaces and instabilities of plates and shells”, seminar at LIPhy Lab, Grenoble, France, February 2019.
- L. Stein-Montalvo**, K. Almeida, and D.P. Holmes. “Buckling of the confined d-cone” at NEW.Mech, Amherst, MA, October 2019 (Poster).
- L. Stein-Montalvo**, P. Costa, M. Pezzulla, K. Almedia, and D.P. Holmes. “Buckling of geometrically confined plates and shells” at the Soft Condensed Matter Physics Gordon Research Conference, New London, NH, August 2019 (Poster).
- L. Stein-Montalvo**, P. Costa, M. Pezzulla, and D.P. Holmes. “Buckling of geometrically confined shells” at NEW.Mech, Providence, RI, October 2018.
- L. Stein-Montalvo**, P. Costa, M. Pezzulla, and D.P. Holmes. “Buckling of geometrically confined shells” at NEW.Mech, Providence, RI, October 2018 (Poster).

## REFERENCES

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- Douglas P. Holmes: dpholmes@bu.edu  
*Associate Professor of Mechanical Engineering, Boston University*
- Elie Bou-Zeid: ebouzeid@princeton.edu  
*Associate Professor of Civil and Environmental Engineering, Princeton University*
- Sigrid Adriaenssens: sadriaen@princeton.edu  
*Professor of Civil and Environmental Engineering, Princeton University*
- Gwennou Coupier: gwennou.coupier@univ-grenoble-alpes.fr  
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