

SANGJOON “JOON” LEE

Ph.D. Candidate at University of California, Berkeley

6116 Etcheverry Hall, University of California, Berkeley, CA 94720, USA

✉ [sangjoonlee@berkeley.edu](mailto:sangjoonlee@berkeley.edu) | 🌐 <https://sangjoonlee.info/>

EDUCATION

**University of California, Berkeley** – Berkeley, CA, USA Aug 2019 - Aug 2024 (Exp.)

*Ph.D. in Mechanical Engineering*

*M.S. in Mechanical Engineering*

- Designated emphasis in *Computational and Data Science and Engineering*

**Seoul National University** – Seoul, South Korea

Mar 2012 - Aug 2018

*B.S. in Mechanical & Aerospace Engineering*

*\* 2-year leave of absence for military service*

*B.B.A. in Business Administration*

- Honors: *Summa cum laude*

RESEARCH  
INTERESTS

**Fluid Mechanics (Emphasis in CFD), Computational Science & Environmental Flows**

- Modeling, computing and analyzing instabilities and turbulent motions in hydro-/aerodynamic flows with concurrent scalar transfers
- Investigating environmental flow problems pertaining to sustainable energy (e.g., gas/wind turbines) and clean ocean and atmosphere (e.g., fine dusts, contrails)

RESEARCH  
EXPERIENCE

**Graduate Student Researcher**, University of California, Berkeley 2020 - 2024

Computational Fluid Dynamics Lab (*Director: Dr. Philip S. Marcus*)

- Numerical examination of destabilizing aircraft wake vortices using both linear and non-linear analyses in association with spectral collocation methods
- Data-driven optimization of hydro-/aerodynamic designs using a Bayesian inference or a genetic algorithm in association with Design-by-Morphing (DbM)

**Researcher**, Seoul National University 2017 - 2018

Energy & Environmental Flow Lab (*Director: Dr. Wontae Hwang*)

- Development of conjugate heat transfer codes analyzing heat convection and conduction simultaneously with an efficient interpolation scheme for thermal properties
- Turbulent channel flow visualization via magnetic resonance velocimetry supplemented with large eddy simulations

**Research Intern**, Seoul National University 2016 - 2017

Turbulence, Flow Control & CFD Lab (*Director: Dr. Haecheon Choi*)

- Large eddy simulations of flow around a small rotating vertical axis wind turbine

JOURNAL  
PUBLICATIONS

1. Solmaz, A. S., Raftery, P., Lee, S., & Duarte, C. (2024). **Effect of Elevated Air Movement on Radiant Cooling Systems**. [In Preparation].

2. Lee, S., & Marcus, P. S. (2024). **Transient Growth of a Wake Vortex and its Initiation via Inertial Particles**. *arXiv Preprint*. [arXiv:2402.07469](https://arxiv.org/abs/2402.07469) [Preprint].
3. Wang, J., Lee, S., & Marcus, P. S. (2024). **Triadic Resonance in Columnar Vortices**. *arXiv Preprint*. [arXiv:2402.05287](https://arxiv.org/abs/2402.05287) [Preprint].
4. Lee, S., Sheikh, H. M., Lim, D. D., Gu, G. X., & Marcus, P. S. (2024). **Bayesian-Optimized Riblet Surface Design for Turbulent Drag Reduction via Design-by-Morphing with Large Eddy Simulation**. *Journal of Mechanical Design*, 146(8), 081701. [doi:10.1115/1.4064413](https://doi.org/10.1115/1.4064413).
5. Lee, S., & Marcus, P. S. (2023). **Linear Stability Analysis of Wake Vortices by a Spectral Method Using Mapped Legendre Functions**. *Journal of Fluid Mechanics*, 967, A2. [doi:10.1017/jfm.2023.455](https://doi.org/10.1017/jfm.2023.455).
6. Sheikh, H. M., Lee, S. (co-first), Wang, J. & Marcus, P. S. (2023). **Airfoil Optimization using Design-by-Morphing**. *Journal of Computational Design and Engineering*, 10 (4), 1443-1459. [doi:10.1093/jcde/qwad059](https://doi.org/10.1093/jcde/qwad059).
7. Lee, S., & Hwang, W. (2019). **Development of an Efficient Immersed-Boundary Method with Subgrid-Scale Models for Conjugate Heat Transfer Analysis using Large Eddy Simulation**. *International Journal of Heat and Mass Transfer*, 134, 198-208. [doi:10.1016/j.ijheatmasstransfer.2019.01.019](https://doi.org/10.1016/j.ijheatmasstransfer.2019.01.019).
8. Baek, S., Lee, S., Hwang, W., & Park, J. S. (2019). **Experimental and Numerical Investigation of the Flow in a Trailing Edge Ribbed Internal Cooling Passage**. *Journal of Turbomachinery*, 141 (1), 011012. [doi:10.1115/1.4041868](https://doi.org/10.1115/1.4041868).

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CONFERENCE  
PAPERS &  
PRESENTATIONS

1. Lee, S., & Marcus, P. S. (2023, Nov 19-21). **Investigation of Triggering Vortex Instabilities with Inertial Particles**. In *Abstr. 76th Annual Meeting of the APS Division of Fluid Dynamics (APS-DFD)*, Washington, DC, USA (no. ZC38.5). American Physical Society.
2. Wang, J., Lee, S., & Marcus, P. S. (2023, Nov 19-21). **Three-Wave Resonance in Neutrally Stable Wake Vortices**. In *Abstr. 76th Annual Meeting of the APS Division of Fluid Dynamics (APS-DFD)*, Washington, DC, USA (no. ZC38.2). American Physical Society.
3. Lee, S., & Marcus, P. S. (2022, Nov 20-22). **Viscous Perturbation to Inviscid Wake Vortices - Perturbation Theory in Vortex Stability**. In *Abstr. 75th Annual Meeting of the APS Division of Fluid Dynamics (APS-DFD)*, Indianapolis, IN, USA (no. Q11.7). American Physical Society.
4. Marcus, P. S., Wang, J. & Lee, S. (2022, Nov 20-22). **A General Framework for Destabilizing Neutrally-Stable Flows Applied to Aircraft Wake Vortices**. In *Abstr. 75th Annual Meeting of the APS Division of Fluid Dynamics (APS-DFD)*, Indianapolis, IN, USA (no. L18.1). American Physical Society.
5. Lee, S., & Marcus, P. S. (2021, Nov 21-23). **Linear Instability Analysis of Wake Vortices by a Spectral Method using Mapped Legendre Functions**. In *Abstr. 74th Annual Meeting of the APS Division of Fluid Dynamics (APS-DFD)*, Pheonix, AZ, USA (no. E24.1). American Physical Society.
6. Wang, J., Lee, S., & Marcus, P. S. (2021, Nov 21-23). **Destabilizing Neutrally Stable Wake Vortices Using Degenerate Eigenmodes**. In *Abstr. 74th Annual Meeting of the APS Division of Fluid Dynamics (APS-DFD)*, Pheonix, AZ, USA (no. E24.3). American Physical Society.
7. Lee, S., & Hwang, W. (2018, Jul 4-6). **Validation of a Conjugate Heat Transfer Code with Subgrid-scale Models for Turbulent Flow**. In *Proc. KSFM 2018 Summer Conference*, Jeju, South Korea (pp. 197-198). Korean Society for Fluid Machinery.

8. Baek, S., Lee, S., Hwang, W. & Park, J. S. (2018, Jun 11-15). **Experimental and Numerical Investigation of the Flow in a Trailing Edge Ribbed Internal Cooling Passage.** In *Proc. ASME 2018 Turbo Expo: Turbomachinery Technical Conference and Exposition, Lillestrøm, Norway* (no. GT2018-76741). American Society of Mechanical Engineers. doi:10.1115/GT2018-76741. *Journal-Quality Appraisal and Transferred to J. Turbomach.*
9. Lee, S. (2017, Nov 1-3). **2D Simulation of an Unsteady Flow around a Small Vertical Axis Wind Turbine Using an Immersed Boundary Method.** In *Proc. KSME 2017 Annual Conference, Jeju, South Korea* (pp. 741-745). Korean Society of Mechanical Engineers. *Student Paper Award: Bronze.*
10. Baek, S., Lee, S. & Hwang, W. (2017, Nov 1-3). **Investigation of Fully Developed Turbulent Pipe Flow Using Magnetic Resonance Velocimetry (MRV) and Large Eddy Simulation (LES).** In *Proc. KSME 2017 Annual Conference, Jeju, South Korea* (pp. 581-583). Korean Society of Mechanical Engineers.

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#### INVITED TALKS & SEMINARS

1. Lee, S. (2023, Aug 8). **Design-by-Morphing (DbM): A Novel Design Methodology for Aerodynamic Optimization.** *2023 Hyundai Vision Conference, Seoul, South Korea.* Hyundai Motors.
2. Lee, S. (2022, Nov 16). **Modern Applications of Computational Fluid Dynamics (CFD).** *2022 Online Special Lecture Series: Research Reinforcement for Sustainable Buildings and Urban Systems in Future, Online.* Department of Architectural and Urban Systems Engineering, Ewha Womans University.
3. Lee, S. (2018, Aug 8). **An Introduction to In-House LES - Applications to Turbine Internal Cooling and Recent Improvements for Conjugate Heat Transfer Analysis.** *KARI Computational Fluid Dynamics Seminar, Daejeon, South Korea.* Korea Aerospace Research Institute.

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#### TEACHING & TUTORING

- Teaching Assistant**, University of California, Berkeley 2024  
Introduction to Computer Programming for Scientists and Engineers (ENGIN 7)  
  - Essential programming strategies and numerical methods for scientific computing
- Course Designer / Graduate Student Instructor**, University of California, Berkeley 2022 - 2023  
Introduction to Aerospace Engineering Design (AERO ENG 10)  
  - Computer-aided two-dimensional airfoil design practices with wind tunnel experiments
- Graduate Student Instructor**, University of California, Berkeley 2019 - 2022  
Experimentation and Measurements (MEC ENG 103)  
  - Measurements and experimental techniques for mechanical engineers
- Undergraduate Tutor**, Seoul National University 2013  
Basic Calculus 1, 2 & Basic Physics 1 (007.098A, 102 & 099A)  
  - Review of basics of university-level calculus and physics

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#### FELLOWSHIPS

- Departmental Graduate Fellowship** 2023  
College of Engineering at University of California, Berkeley  
  - Selective departmental recognition offering stipends with tuition and fee waivers
- Overseas Ph.D. Scholarship**, Study Abroad Doctoral Program 2019 - 2023  
Ilju Academy & Culture Foundation

- Merit-based financial aids for promising Ph.D. students studying out of Korea
- Selected as one of 6 recipients in 2019

**National Scholarship for Science and Engineering** 2012 - 2017  
Korea Student Aid Foundation (KOSAF)

- Full-tuition scholarship for undergraduates with strong academic performance

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HONORS &  
AWARDS

**Outstanding Graduate Student Instructor (OGSI) Award** 2021  
GSI Teaching & Resource Center at University of California, Berkeley

**Representative of the Engineering Class of 2018**, 72nd Summer Commencement 2018  
Seoul National University

**Student Paper Award: Bronze**, 9th National Fluid Engineering Contest for Undergraduates 2017  
Fluid Engineering Division of Korean Society of Mechanical Engineers

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COMMUNITY  
SERVICE

**SNU Tomorrow's Engineers Membership**, Seoul National University 2016 - 2018  
Member & Head Manager

- Annual *Vision Mentoring* for high school students interested in engineering and science
- Student-driven regular intercollegiate academic exchange sessions

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LANGUAGES

**English, Korean**  
Native/Bilingual