Chengyu Li

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RESEARCH INTERESTS

Fluid mechanics, computational fluid dynamics, biomimetic and bioinspired flows, biomedical flows, immersed boundary method, fluid-structure interaction, reduced order modeling, high-performance computing.

APPOINTMENTS

Case Western Reserve University, Cleveland, OH 2024 – Present
Associate Professor
Department of Mechanical and Aerospace Engineering

Villanova University, Villanova, PA 2018 – 2024
Assistant Professor
Department of Mechanical Engineering

The Ohio State University, Columbus, OH 2016 – 2018
Postdoctoral Researcher
Wexner Medical Center (Advisor: Kai Zhao)

EDUCATION

University of Virginia, Charlottesville, VA 2016
Ph.D. in Mechanical and Aerospace Engineering
Dissertation: Computational Investigation of Vortex Dynamics and Aerodynamic Performance in Flapping Propulsion (Advisor: Haibo Dong)

University of Virginia, Charlottesville, VA 2014
M.S. in Mechanical and Aerospace Engineering
Thesis: Unsteady Flow and Aerodynamic Effect of a Dynamic Trailing-Edge Flap in Flapping Flight (Advisor: Haibo Dong)

Dalian Jiaotong University, Dalian, China 2010
B.S. in Mechanical Engineering

HONORS & AWARDS

National/International Awards:

- **AFOSR Young Investigator Program (YIP) Award,** 2024
- **NSF Faculty Early Career Development Program (CAREER) Award**, 2021
- **Ralph E. Powe Junior Faculty Enhancement Award**, Oak Ridge Associated Universities (ORAU), 2019
- **Polak Young Investigator Award**, Association for Chemoreception Sciences (AChemS), 2017

Professional Society Awards:

- **AIAA Flow Visualization Showcase (1st Place),** AIAA AVIATION Forum, 2023
- **ASME Lewis F. Moody Award,** ASME Fluids Engineering Division, 2022
- **ASME Fluids Engineering Division Summer Meeting (FEDSM) Best Paper Award**, 2021
- **ASME Flow Visualization Competition (2nd Place)**, ASME AJK Fluids, 2019

Local and Institutional Awards:

- **University Summer Research Grant Award**, Villanova University, 2019, 2021, 2023
- **PI of the Month**, Villanova University, 2020
- **Outstanding Ph.D. Research Presentation Award**, University of Virginia, 2017

AWARDED GRANTS

- **AFOSR YIP, FA9550-24-1-0122** **07/01/2024 – 06/30/2027**
  Title: Deciphering the influence of unsteady aerodynamics on mechanosensation and olfaction in insect flight
  Investigator: Chengyu Li (PI)
  Award: $449,806

- **NSF Fluid Dynamics, CBET-2451990** **05/15/2021 – 04/30/2024**
  Title: Collaborative Research: Scaling of ciliary flows at intermediate Reynolds number
  Investigator: Chengyu Li (PI)
  Award: $183,948

- **NSF CAREER, CBET-2453175** **01/01/2021 – 12/31/2025**
  Title: CAREER: Odor-guided flapping flight: Novel fluid dynamic mechanisms of insect navigation
  Investigator: Chengyu Li (PI)
  Award: $500,000

- **Oak Ridge Associated Universities** **06/01/2019 – 05/31/2020**
  Title: Flow physics of odor-guided aeronautic navigation in nature
  Investigator: Chengyu Li (PI)
  Award: $10,000

BOOK CHAPTERS

B.1. **Chengyu Li**, Kai Zhao, Dennis Shusterman, Hadrien Calmet, Alister Bates, Joey Siu, and Richard Douglas, "*Clinical CFD Applications I - Nasal Obtruction and Empty Nose Syndrome: What Are our Noses Sensing?*" Clinical & Biomedical Engineering of the Human Nose, Springer, 2021.

B.2. Haibo Dong, Ayodeji Bode-Oke, and **Chengyu Li**, "*Learning from Nature: Unsteady Flow Physics in Bio-Inspired Flapping Flight*," In Flight Physics – Models, Techniques and Technologies, InTech, 2018.

JOURNAL ARTICLES

[Advised graduate students; †corresponding author]

J.1. Menglong Lei and **Chengyu Li**†, "*Role of fluid-structure interactions in mechanosensation during hovering flapping flight*." Journal of Fluids and Structures 136, 104329 (2025).

J.2. Zhipeng Lou, Nils Tack, Monica Wilhelmus, and **Chengyu Li**†, "*Edge vortex interaction minimizes drag in shrimp swimming*." Physical Review Fluids 10, 043103 (2025).

J.3. Naeem Haider, Zhipeng Lou, Shih-Jung Hsu, Bo Cheng, and **Chengyu Li**†, "*Flapping dynamics and wing flexibility enhance odor detection in blue bottle flies*." Bioinspiration & Biomimetics 20, 026025 (2025).

J.4. Menglong Lei and **Chengyu Li**†, "*Effects of flapping kinematics on odor plume dynamics in low Reynolds number settings*." Physics of Fluids 37, 031917 (2025).

J.5. Seth Lionetti, Menglong Lei, Tyson Hedrick, and **Chengyu Li**†, "*Benefits of low-speed flight in odor-tracking navigation for hawkmoths*." Physics of Fluids 37, 021911 (2025).

J.6. Zhipeng Lou, Menglong Lei, Haibo Dong, and **Chengyu Li**†, "*Wing-antenna interaction reduces odor fatigue in butterfly odor-tracking flight*." Journal of Fluid Mechanics, 998, A45 (2024).

J.7. Maham Kamran, Amirhossein Fardi, and **Chengyu Li**, Muhammad Saif Ullah Khalid, "*How does vortex dynamics help undulating bodies spread odor?*" Physics of Fluids 36, 111916 (2024).

J.8. Seth Lionetti, Zhipeng Lou, Adrian Herrera-Amaya, Margaret Byron, and **Chengyu Li**†, "*A new propulsion enhancement mechanism in metachronal rowing at intermediate Reynolds numbers*." Journal of Fluid Mechanics 974, A45 (2023).

J.9. Menglong Lei and **Chengyu Li**†, "*Wings and Whiffs: Understanding the role of aerodynamics in odor-guided flapping flight*" Physics of Fluids 35, 121901 (2023).
[*Featured Article & Scilight*]

J.10. Menglong Lei, Mark Willis, Bryan Schmidt, and **Chengyu Li**†, "*Numerical investigation of odor-guided navigation in flying insects: Impact of turbulence, wing-induced flow, and Schmidt number on odor plume structures*." Biomimetics 8(8), 593 (2023).

J.11. Seth Lionetti, Tyson Hedrick, and **Chengyu Li**†, "*Aerodynamic explanation of flight speed limits in hawkmoth-like flapping-wing insects*" Physical Review Fluids 7, 093104 (2022).
[*Featured in APS Physics Magazine & Editors' Suggestion*]

J.12. Liu Yun, Angel Lozano, Tyson Hedrick, and **Chengyu Li**, "*Comparison of experimental and numerical studies on the flow structures of hovering hawkmoths*," Journal of Fluids and Structures 107, 103405 (2021).

J.13. **Chengyu Li**†, "*Effects of wing pitch kinematics on both aerodynamic and olfactory functions in upwind surge*," Journal of Mechanical Engineering Science 235(2), 296-307 (2021).

J.14. Menglong Lei and **Chengyu Li**†, "*The aerodynamic performance of passive wing pitch in hovering flight*," Physics of Fluids 32, 051902 (2020).
[*Featured Article*]

J.15. **Chengyu Li**†, Haibo Dong, and Bo Cheng, "*Tip vortices formation and evolution of rotating wings at low Reynolds numbers*," Physics of Fluids 32, 021905 (2020).
[*Featured Article & Scilight*]

J.16. **Chengyu Li**†, Haibo Dong, Kai Zhao, "*Dual functions of insect wings in an odor-guided aeronautic navigation*," Journal of Fluids Engineering 142, 030902 (2020).

J.17. Zhenxing Wu, John Craig, Guillermo Maza, **Chengyu Li**, Bradley Otto, Alexander Farag, Ricardo Carrau, and Zhao Kai, "*Peak sinus pressures during sneezing in healthy controls and post-skull base surgery patients*, " The Laryngoscope 130, 2138-2143 (2020).

J.18. Jennifer Malik, Andrew Thamboo, Sachi Dholakia, Nicole Borchard, Sam McGhee, **Chengyu Li**, Kai Zhao, Jayakar Nayak, "*The cotton test redistributes nasal airflow in patients with empty nose syndrome*, " International Forum of Allergy & Rhinology 10, 539-545 (2020).

J.19. **Chengyu Li**, Guillermo Maza, Alexander Farag, Jillian Krebs, Bhakthi Deshpande, Bradley Otto, and Kai Zhao, "*Asymptomatic vs. symptomatic septal perforations: A computational fluid dynamics examination*," International Forum of Allergy & Rhinology 9, 883-890 (2019).

J.20. Jennifer Malik, **Chengyu Li**, Alexander Farag, Bradley Otto, and Kai Zhao, "*Computational fluid dynamics analysis of aggressive turbinate reductions: Is it a culprit of empty nose syndrome*," International Forum of Allergy & Rhinology 9, 891-899 (2019).

J.21. Guillermo Maza, **Chengyu Li**, Jillian Krebs, Bradley Otto, Alexander Farag, Ricardo Carrau, Kai Zhao, "*Computational fluid dynamics after endoscopic endonasal skull based surgery: Association with empty nose syndrome?*" International Forum of Allergy & Rhinology 9, 204-211 (2019).

J.22. Junshi Wang, Yan Ren, **Chengyu Li**, and Haibo Dong, "*Computational investigation of lift enhancement mechanism due to wing-body interaction in hummingbird forward flight*," Bioinspiration & Biomimetics 14, 046010 (2019).

J.23. Min Xu, Mingjun Wei, **Chengyu Li**, and Haibo Dong, "*Adjoint-based optimization for thrust performance of three dimensional pitching-rolling plate*," AIAA Journal 57, 9 3716-3727 (2019).

J.24. Suhyla Alam, **Chengyu Li**, Kathryn Bradbum, Kai Zhao, Thomas Lee, "*Impact of middle turbinectomy on airflow to the olfactory cleft: A computational fluid dynamics study*," American Journal of Rhinology & Allergy 33(3), 263-268 (2019).

J.25. **Chengyu Li**, Haibo Dong, Kai Zhao, "*A balance between aerodynamic and olfactory performance during flight in Drosophila*," Nature Communications 9, 3215 (2018).

J.26. **Chengyu Li**, Jianbo Jiang, Kanghyun Kim, Bradley Otto, Alexander Farag, Bradley Cowart, Edmund Pribitkin, Pamela Dalton, and Kai Zhao, "*Nasal structural and aerodynamic features that may benefit normal olfactory sensitivity*," Chemical Senses 43, 229-237 (2018).

J.27. **Chengyu Li**, Alexander Farag, Guillermo Maza, Sam McGhee, Michael Ciccone, Bhakthi Deshpande, Edmund Pribitkin, Bradley Otto, and Kai Zhao, "*Investigation of the abnormal*

nasal aerodynamics and trigeminal functions among empty nose syndrome patients," International Forum of Allergy & Rhinology 8, 444-452 (2018).

J.28. Lauren Eichaker, **Chengyu Li**, Nakesha King, Victoria Pepper, Cameron Best, Ekene Onwuka, Eric Heuer, Kai Zhao, Jonathan Grischkan, Christopher Breuer, Jed Johnson, and Tendy Chiang, "*Quantification of tissue engineered trachea performance with computational fluid dynamics*," The Laryngoscope 128, E272-E279 (2018).

J.29. Tirth Patel, **Chengyu Li**, Jillian Krebs, Kai Zhao and Prashant Malhotra, "*Modeling congenital nasal pyriform aperture stenosis using computational fluid dynamics*," International Journal of Pediatric Otorhinolaryngology 109, 180-184 (2018).

J.30. Thomas Lee, Parul Goyal, **Chengyu Li**, and Kai Zhao, "*Computational fluid dynamics to evaluate the effectiveness of inferior turbinate reduction techniques to improve nasal airflow*," JAMA Facial Plastic Surgery 20, 263-270 (2018).

J.31. **Chengyu Li**, Jianbo Jiang, Haibo Dong, and Kai Zhao, "*Computational modeling and validation of human nasal airflow under various breathing conditions*," Journal of Biomechanics 64, 59-68 (2017).

J.32. **Chengyu Li**, Alexander Farag, James Leach, Bhakthi Deshpande, Adam Jacobowitz, Kanghyun Kim, Bradley Otto, and Kai Zhao, "*Computational fluid dynamics and trigeminal sensory examinations of empty nose syndrome patients*," The Laryngoscope 127, E176-E184 (2017).

J.33. **Chengyu Li** and Haibo Dong, "*Wing kinematics measurement and aerodynamics of a dragonfly in turning flight*," Bioinspiration & Biomimetics 12, 026001 (2017).

J.34. Bradley Otto, **Chengyu Li**, Alexander Farag, Benjamin Bush, Jillian Krebs, Ryan Hutcheson, Kanghyun Kim, Bhakthi Deshpande, and Kai Zhao, "*Computational fluid dynamics evaluation of posterior septectomy as a viable treatment option for large septal perforation*," International Forum of Allergy & Rhinology 7, 718-725 (2017).

J.35. Jasper Shen, Kevin Hur, **Chengyu Li**, Kai Zhao, Donald A. Leopold, and Bozena B. Wrobel, "*Determinants and evaluation of nasal airflow perception*," Facial Plastic Surgery 33(04), 372-377 (2017). Errata: Change in Authorship (Vol. 33(05), 553-554, 2017)

J.36. **Chengyu Li** and Haibo Dong, "*Three-dimensional wake topology and propulsive performance of low-aspect-ratio pitching-rolling plates*," Physics of Fluids 28, 071901 (2016).

J.37. Geng Liu, Haibo Dong, and **Chengyu Li**, "*Vortex dynamics and new lift enhancement mechanism of wing-body interaction in insect forward flight*," Journal of Fluid Mechanics 795, 634-651 (2016).

J.38. **Chengyu Li**, Haibo Dong, and Geng Liu, "*Effects of a dynamic trailing-edge flap on the aerodynamic performance and flow structures in hovering flight*," Journal of Fluids and Structures 58, 49-65 (2015).

J.39. Min Xu, Mingjun Wei, **Chengyu Li**, and Haibo Dong, "*Adjoint-based optimization of flapping plates hinged with a trailing-edge flap*," Theoretical & Applied Mechanics Letters 5, 1-4 (2015).

Under Review

J.40. Adrian Herrera-Amaya, Nils Tack, Zhipeng Lou, **Chengyu Li**, and Monica Wilhelmus, "*The effects of temperature and viscosity on the metachronal swimming of crustaceans*." Under review.

J.41. Maham Kamran, Amirhossein Fardi, and **Chengyu Li**, and Muhammad Saif Ullah Khalid, "*On the role of morphology and kinematics of biological swimmers to spread and suppress their odors in the wake*." Under review.

J.42. Zhipeng Lou, Adrian Herrera-Amaya, Margaret Byron, and **Chengyu Li**†, "*Inter-appendage interaction and its impact on scaling hydrodynamic performance with appendage number in metachronal paddling*." Under review.

CONFERENCE PAPERS

C.1. Jiahui Wang and **Chengyu Li**, "*Effects of pencasts in online videos*," Association for Educational Communications and Technology (AECT) International Convention, Las Vegas, Nevada, October, 2025.

C.2. Naeem Haider, Seth Lionetti, and **Chengyu Li**†, "*Impact of reduced stiffness on the aerodynamic performance of flapping wings*," ASME FEDSM, Philadelphia, Pennsylvania, July, 2025.

C.3. Yiding Feng, Naeem Haider, and **Chengyu Li**†, "*Effects of wing flexibility on the wing-wing interactions of a dragonfly in forward flight*," ASME FEDSM, Philadelphia, Pennsylvania, July, 2025.

C.4. Zhipeng Lou, Nils Tack, Monica Whilhelmus, and **Chengyu Li**†, "*Hydrodynamics of shrimp swimming: Spread-out morphing of pleopods in power stroke*," ASME IMECE, Portland, Oregon, November, 2024.

C.5. Zhipeng Lou, Menglong Lei, Margaret Byron, and **Chengyu Li**†, "*Fluid-structure interaction analysis of metachronal propulsion at intermediate Reynolds numbers*," ASME IMECE, Portland, Oregon, November, 2024.

C.6. Zhipeng Lou, Menglong Lei, Margaret Byron, and **Chengyu Li**†, "*A computational analysis of fluid-structure interaction in metachronal propulsion*," ASME FEDSM, Anaheim, California, July, 2024.

C.7. Seth Lionetti, Tyson Hedrick, and **Chengyu Li**†, "*Sparse reduced-order modeling of a hovering hawkmoth's wake*," ASME FEDSM, Anaheim, California, July, 2024.

C.8. Menglong Lei, Zhipeng Lou, Junshi Wang, Haibo Dong, and **Chengyu Li**†, "*Hydrodynamics of metachronal rowing at intermediate Reynolds numbers*," ASME IMECE, New Orleans, Louisiana, October, 2023.

C.9. Alec Menzer, Menglong Lei, **Chengyu Li**, and Haibo Dong, "*A multiphysics approach to understanding chemoreception in fish schools*" ASME IMECE, New Orleans, Louisiana, October, 2023.

C.10. Zhipeng Lou and **Chengyu Li**†, "*Unsteady aerodynamics and wake structures of butterfly in forward flight*" AIAA Aviation, San Diego, California, June, 2023.

C.11. Seth Lionetti, Tyson Hedrick, and **Chengyu Li**†, "*Numerical investigation of olfactory performance in upwind surging hawkmoth flight*" AIAA Aviation, San Diego, California, June, 2023.

C.12. Menglong Lei, and **Chengyu Li**†, "*A balance between odor intensity and odor perception range in odor-guided flapping flight*," ASME FEDSM, Toronto, Canada, August, 2022.

C.13. Zhipeng Lou, Adrian Herrera-Amaya, Margaret Byron, and **Chengyu Li**†, "*Hydrodynamics of metachronal motion: Effects of spatial asymmetry on the flow interaction between adjacent appendages*," ASME FEDSM, Toronto, Canada, August, 2022.

C.14. Alec Menzer, **Chengyu Li**, Frank Fish, Yuchen Gong, and Haibo Dong "*Modeling and computation of batoid wwimming inspired pitching impact on wake structure and hydrodynamic performance*," ASME FEDSM, Toronto, Canada, August, 2022.

C.15. Menglong Lei, and **Chengyu Li**†, "*Effects of wing kinematics on modulating the odor plume structures in odor tracking flight*," ASME FEDSM, Virtual Meeting, August, 2021.

C.16. Menglong Lei, John Crimaldi, and **Chengyu Li**†, "*Navigation in odor plumes: How do the flapping kinematics modulate the odor landscape?*" AIAA Aviation, Virtual Meeting, August, 2021.

C.17. Menglong Lei and **Chengyu Li**†, "*Numerical investigation of passive pitching mechanism in odor-tracking flights*," AIAA Aviation, Virtual Meeting, June 2020.

C.18. **Chengyu Li**†, Junshi Wang, Geng Liu, Xiaolong Deng, Haibo Dong, "*Passive pitching mechanism of three-dimensional flapping wings in hovering flight*," ASME AJK Joint Fluid Summer Meeting, San Francisco, California, July 2019.

C.19. Junshi Wang, **Chengyu Li**, Ruijie Zhu, Geng Liu, and Haibo Dong, "*Wake structure and aerodynamic performance of passively pitching revolving plates*," AIAA Science and Technology Forum and Exposition, San Diego, California, January 2019.

C.20. Junshi Wang, **Chengyu Li**, Yan Ren, and Haibo Dong, "*Effect of surface morphing on the wake structure and performance of flapping plates*," 47th AIAA Fluid Dynamics Conference and Exhibit, Denver, Colorado, June 2017.

C.21. **Chengyu Li**†, Haibo Dong, and Bo Cheng, "*Effects of aspect ratio and angle of attack on tip vortex structures and aerodynamic performance for rotating flat plates*," 47th AIAA Fluid Dynamics Conference and Exhibit, Denver, Colorado, June 2017.

C.22. **Chengyu Li**†, Junshi Wang, and Haibo Dong, "*Proper orthogonal decomposition analysis of flapping hovering wings*," 55th AIAA Aerospace Sciences Meeting, Gaylord, Texas, January 2017.

C.23. **Chengyu Li** and Haibo Dong, "*Quantification and analysis of propulsive wake topologies in finite aspect-ratio pitching-rolling plates*," 46th AIAA Fluid Dynamics Conference and Exhibit, Washington D.C., June 2016.

C.24. **Chengyu Li**, Haibo Dong, and Zongxian Liang, "*Proper orthogonal decomposition analysis of 3-D wake structures in a pitching-rolling plate*," 54th AIAA Aerospace Sciences Meeting, San Diego, California, January 2016.

C.25. **Chengyu Li**, Haibo Dong, and Yan Ren, "*A numerical study of flapping plates hinged with a trailing-edge flap*," 32nd AIAA Applied Aerodynamics Conference, Atlanta, Georgia, June 2014.

C.26. **Chengyu Li** and Haibo Dong, "*Wake structure and aerodynamic performance of low aspect-ratio revolving plates at low Reynolds number*," 52nd AIAA Aerospace Sciences Meeting, National Harbor, Maryland, January 2014.

C.27. Hui Wan, Haibo Dong, **Chengyu Li**, and Zongxian Liang, "*Vortex formation and aerodynamic force of low aspect-ratio plate in translation and rotation*," 42nd AIAA Fluid Dynamics Conference and Exhibit, New Orleans, Louisiana, June 2012.

PRESENTATIONS & POSTERS

P.1. Naeem Haider, Seth Lionetti, Zhipeng Lou, and **Chengyu Li**, "*Effects of wing damage on aerodynamic performance and structural integrity in flapping wings*," 77th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Salt Lake City, Utah, November 2024.

P.2. Seth Lionetti and **Chengyu Li**, "*Data-driven reduced-order modeling of a flying hawkmoth's wake*," 77th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Salt Lake City, Utah, November 2024.

P.3. Zhipeng Lou, Margaret Byron, and **Chengyu Li**, "*Enhancing metachronal swimming efficiency through dynamic substructure*," 77th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Salt Lake City, Utah, November 2024.

P.4. Naeem Haider, Zhipeng Lou, Bo Cheng, and **Chengyu Li**, "*Flight and smell: Exploring the impact of wing structure and kinematics on the olfactory function of flies in upwind surging flight*," 76th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Washington, DC, November 2023.

P.5. Zhipeng Lou, Nils Tack, Monica Wilhelmus, and **Chengyu Li**, "*Exploring the hydrodynamic advantages of pleopod interaction in shrimp swimming*," 76th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Washington, DC, November 2023.

P.6. Seth Lionetti, Tyson Hedrick, and **Chengyu Li**, "*Reduced order modeling of wake structures in hawkmoth hovering flight*," 76th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Washington, DC, November 2023.

P.7. Menglong Lei, Junshi Wang, Haibo Dong, and **Chengyu Li**, "*Fluid-structure interaction modeling of fruit fly wings in hovering flight*," 76th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Washington, DC, November 2023.

P.8. Zhipeng Lou, Menglong Lei, Margaret Byron, and **Chengyu Li**, "*Propulsion through asymmetry: Examining flow-structure interactions of Ctenophore appendages with asymmetric stiffness*," 76th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Washington, DC, November 2023.

P.9. Menglong Lei and **Chengyu Li**, "*Unsteady aerodynamics and odorant transport in an upwind surging flight of Drosophia*," 75th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Indianapolis, Indiana, November 2022.

P.10. Seth Lionetti, Tyson Hedrick, **Chengyu Li**, "*Effects of flight speed on olfactory sensitivity in upwind surging flights of a hawkmoth*," 75th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Indianapolis, Indiana, November 2022.

P.11. Zhipeng Lou, Adrian Herrera-Amaya, Margaret Byron, **Chengyu Li**, "*Hydrodynamics of metachronal rowing at low-to-intermediate Reynolds numberrs*," 75th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Indianapolis, Indiana, November 2022.

P.12. Seth Lionetti, Zhipeng Lou, Adrian Herrera-Amaya, Margaret Byron, **Chengyu Li**, "*Effects of substrate geometry on the hydrodynamics of ciliary propulsion*," 74th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Phoenix, Arizona, November 2021.

P.13. Zhipeng Lou, Menglong Lei, Haibo Dong, Kai Zhao, **Chengyu Li**, "*Effects of wing-induced flow on the odor plume structures in an upwind surging flight of monarch butterfly*," 74th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Phoenix, Arizona, November 2021.

P.14. Menglong Lei, Floris van Breugel, **Chengyu Li**, "*How the flapping wing kinematics and flight trajectories modulate the odor plume structure in the odor tracking flight of fruit flies?*" 73rd Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Virtual, November 2020.

P.15. Karoline Menze, Pan Liu, Bo Cheng, **Chengyu Li**, "*Unsteady flow and force control for flies landing upside down on a ceiling*," 73rd Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Virtual, November 2020.

P.16. Seth Lionetti, Tyson Hedrick, **Chengyu Li**, "*Wing kinematics and unsteady aerodynamics of hawkmoth in hovering and forward flight*," 73rd Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Virtual, November 2020.

P.17. Yun Liu, **Chengyu Li**, Angel Lozano, "*Vortex structure comparison between experimental and computational studies on a hovering hawkmoth*," 73rd Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Virtual, November 2020.

P.18. **Chengyu Li**, Michael Corbi, Tyson Hedrick, "*Why are long sequences of steady flight less common at higher speeds of forward flight in Hawkmoth?*" 72nd Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Seattle, Washington, November 2019.

P.19. Menglong Lei and **Chengyu Li**, "*Effect of torsional stiffness on passive wing pitch and its aerodynamic performance in hovering flight*," 72nd Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Seattle, Washington, November 2019.

P.20. **Chengyu Li**, Haibo Dong, Kai Zhao, "*Dual functions of insect wings: balancing aerodynamics and olfaction*," 71st Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Atlanta, Georgia, November 2018.

P.21. **Chengyu Li**, Guillermo Maza, Alexander Farag, Jillian Krebs, Bhakthi Deshpande, Bradley Otto, Kai Zhao, "*Asymptomatic vs. symptomatic septal perforations: a computational fluid dynamics examination*," ARS 64th Annual Meeting, Atlanta, Georgia, October 2018.

P.22. **Chengyu Li**, Guillermo Maza, Alexander Farag, Jillian Krebs, Sam McGhee, Gabriela Zappitelli, Bhakthi Deshpande, Bradley Otto, Kai Zhao, "*CFD analysis of aggressive turbinate reductions: Is it a sulprit of ENS*," ARS 64th Annual Meeting, Atlanta, Georgia, October 2018.

P.23. Kai Zhao, Alexander Farag, **Chengyu Li**, Gabriela Zappitelli, Sam McGhee, Bhakthi Deshpande, Bradley Otto, "*Effective relieve of empty nose syndrome symptoms through a novel nasal plug that cost a few cents*," ARS 64th Annual Meeting, Atlanta, Georgia, October 2018.

P.24. Guillermo Maza, Jillian Krebs, **Chengyu Li**, Sam McGhee, Alexander Farag, Kai Zhao, Bradley Otto, "*Altered nasal airflow pattern as a possible contributor to symptoms in a case of refractory chronic rhinosinusitis*," ARS 64th Annual Meeting, Atlanta, Georgia, October 2018.

P.25. Kanghyun Kim, **Chengyu Li**, Kai Zhao, "*A nasal aerodynamics perspective of Retronasal olfaction: Rodents vs. human*," 40th AChemS Annual Meeting, Bonita Springs, Florida, April 2018.

P.26. **Chengyu Li**, Haibo Dong, Kai Zhao, "*Dual functions of insect wings: Balancing aerodynamics and olfaction*," 40th AChemS Annual Meeting, Bonita Springs, Florida, April 2018.

P.27. **Chengyu Li**, Alexander Farag, Guillermo Maza, Sam McGhee, Michael Ciccone, Bhakthi Deshpande, Edmund Pribitkin, Bradley Otto, Kai Zhao, "*Abnormal nasal aerodynamics and trigeminal functions in empty nose syndrome patients*," 40th AChemS Annual Meeting, Bonita Springs, Florida, April 2018.

P.28. **Chengyu Li**, Guillermo Maza, Bradley Hittle, Gregory Wiet, Don Stredney, Kai Zhao, "*Endoscopic sinus surgery simulator to optimize surgical outcomes: A pilot study on conductive olfactory losses*," Combined Otolaryngology Spring Meetings (COSM), National Harbor, Maryland, April 2018.

P.29. Guillermo Maza, **Chengyu Li**, Jillian Krebs, Bradley Otto, Alexander Farag, Ricardo Carrau, Kai Zhao, "*Computational fluid dynamics after endoscopic endonasal skull based surgery: Association with empty nose syndrome?*" Combined Otolaryngology Spring Meetings (COSM), National Harbor, Maryland, April 2018.

P.30. Kun Jia, Minjun Wei, Min Xu, **Chengyu Li**, and Haibo Dong, "*An adjoint approach to study a flexible flapping wing in pitching-rolling motion*," 70th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Denver, Colorado, November 2017.

P.31. Tirth Patel, **Chengyu Li**, Jillian Krebs, Kai Zhao, Prashant Malhotra, "*Computational modeling of pyriform aperture stenosis,*" AAO-HNSF Annual Meeting, Chicago, Illinois, September 2017.

P.32. Bradley Hittle, **Chengyu Li**, Guillermo Maza, Hector J Medina-Fetterman, Brad A Otto, Alexander A Farag, Gregory J. Wiet, Don Stredney, Kai Zhao, "*Developing endoscopic sinus surgery simulator to optimize surgical outcome to olfactory losses*," ARS 63rd Annual Meeting, Chicago, Illinois, September 2017.

P.33. **Chengyu Li**, Alexander Farag, Sam McGhee, Guillermo Maza, Michael Ciccone, Bhakthi Deshpande, Edmund Pribitkin, Bradley Otto, Kai Zhao, "*Examine the abnormal nasal aerodynamics among empty nose syndrome patients,*" ARS 63rd Annual Meeting, Chicago, Illinois, September 2017.

P.34. **Chengyu Li**, Haibo Dong, and Bo Cheng, "*Effects of aspect ratio on tip vortex structures and power reduction in revolving wings*," 2nd biennial Flow Visualization Event, Denver, Colorado, June 2017.

P.35. **Chengyu Li**, Haibo Dong, and Kai Zhao, "*Computational investigation of fruit fly aerodynamics in forward flight*," Ohio Supercomputer Center Spring Conference, Columbus, Ohio, April 2017.

P.36. **Chengyu Li**, Alexander Farag, James Leach, Bhakthi Deshpande, Adam Jacobowitz, Kanghyun Kim, Bradley Otto, Kai Zhao, "*Computational and trigeminal examinations of empty nose syndrome*," 39th AChemS Annual Meeting, Bonita Springs, Florida, April 2017.

P.37. Kai Zhao, **Chengyu Li**, Kanghyun Kim, Jianbo Jiang, Beverly J. Cowart, Edmund A. Pribitkin, and Pamela Dalton, "*Nasal airflow vortex resulted in better olfactory sensitivity among healthy controls*," 39th AChemS Annual Meeting, Bonita Springs, Florida, April 2017.

P.38. Bradley Hittle, **Chengyu Li**, Hector J Medina-Fetterman, Brad A Otto, Alexander A Farag, Gregory J. Wiet, Don Stredney, Kai Zhao, "*Use virtual reality to optimize sinus surgery treatment of olfactory losses due to nasal obstruction*," 39th AChemS Annual Meeting, Bonita Springs, Florida, April 2017.

P.39. Bradley A. Otto, **Chengyu Li**, Alexander A. Farag, Jilian P. Krebs, Kai Zhao, "*CFD evidence of posterior septectomy as viable treatment option for septal perforation*," Combined Otolaryngology Spring Meetings (COSM), San Diego, California, April 2017.

P.40. Nakesha King, Victoria Pepper, Cameron Best, Ekene Onwuka, **Chengyu Li**, Eric Heuer, Jed Johnson, Kai Zhao, Jonathan Grischkan, Christopher Breuer, and Tendy Chiang, "*A pilot study: Using computational fluid dynamics to model physiologic airflow through an ovine tissue engineered tracheal graft*," Association for Clinical and Translational Science (ACTS), Washington, D.C., April 2017.

P.41. Geng Liu, **Chengyu Li**, Yan Ren, Nidhin Babu, and Haibo Dong, "*Wing-body interaction and new lift enhancement mechanism in cicada's free flight*," Annual Meeting of the Society for Integrative and Comparative Biology (SICB), Portland, Oregon, January 2016.

P.42. Geng Liu, **Chengyu Li**, Haibo Dong, and George Lauder, "*Dynamic surface morphing of sunfish caudal fin enhances its propulsive efficiency in steady swimming*," 68th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Boston, Massachusetts, November 2015.

P.43. Geng Liu, Yan Ren, **Chengyu Li**, Haibo Dong, and Hilary Bart-Smith, "*Fin flexion and flow modulation in manta's forward swimming*," Video Gallery of Fluid Motion, 68th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Boston, Massachusetts, November 2015.

P.44. Haibo Dong, Geng Liu, **Chengyu Li**, Hilary Bart-Smith, and Frank Fish, "*Understanding the role of fin flexion in Rays' forward swimming*," Annual Meeting of the Society for Integrative and Comparative Biology (SICB), West Palm Beach, Florida, January 2015.

P.45. Geng Liu, **Chengyu Li**, Haibo Dong, and George Lauder, "*On the chordwise and spanwise flexibilities of fish fin during free swimming*," 51st Annual Technical Meeting of the Society of Engineering Science, Purdue University, West Lafayette, Indiana, October 2014.

P.46. Geng Liu, **Chengyu Li**, and Haibo Dong, "*Does dragonfly's abdomen flexion help with fast turning maneuvers?*" 66th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Pittsburgh, Pennsylvania, November 2013.

P.47. **Chengyu Li**, Haibo Dong, and Wen Zhang, "*Flying with abrupt wing flapping: Damselfly in darting flight*," Video Gallery of Fluid Motion, 66th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Pittsburgh, Pennsylvania, November 2013.

P.48. **Chengyu Li**, Haibo Dong, Wen Zhang, and Kuo Gai, "*Flow modulation and force control in insect fast maneuver*," 65th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, San Diego, California, November 2012.

P.49. Haibo Dong, **Chengyu Li**, Zongxian Liang, and Xiang Yun, "*Unsteady flow and force control in butterfly take-off flight*," Video Gallery of Fluid Motion, 65th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, San Diego, California, November 2012.

P.50. Yan Ren, Zhe Ning, Kuo Gai, **Chengyu Li**, Samane Zeyghami, and Haibo Dong, "*Deterioration of damselfly flight performance due to wing damage*," Video Gallery of Fluid Motion, 64th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Baltimore, Maryland, November 2011.

P.51. **Chengyu Li**, Haibo Dong, and Samane Zeyghami, "*Role of wing/body flexibility in insect maneuver*," 64th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Baltimore, Maryland, November 2011.

INVITED TALKS

I.1. *Advancing Human Capabilities through Multiphysics Modeling of Biological Fluid Systems*, Department of Mechanical and Aerospace Engineering, Case Western Reserve University, Mar. 7, 2024

I.2. *Deciphering the Fluid Dynamics of Biological Locomotion: A Computational Framework for Advancing Bio-Inspired Flow Systems*, Autonomous and Intelligent Robotics Laboratory, Lakehead University, Canada, Keynote Speaker, Virtual seminar, Sep. 22, 2023

I.3. *Image-based computational modeling of biological fluid systems*, Department of Mechanical and Aerospace Engineering, North Carolina State University, Feb. 28, 2023

I.4. *Computational modeling of biological and physiological flows using a versatile Cartesian grid method*, University of Delaware, Feb. 24, 2023

I.5. *High-fidelity computational modeling of biological fluid systems*, Department of Mechanical Engineering, University of Houston, Feb. 3, 2023

I.6. *Image-based computational modeling of biological fluid systems*, Department of Mechanical and Aerospace Engineering, Case Western Reserve University, Nov. 18, 2022

I.7. *Odor-guided flapping flight: How do the flapping kinematics modulate the odor landscape?* ASME Fluids Engineering Division, Online Seminar Series, Jun. 8, 2022

I.8. *Physics-based modeling of biological and physiological flows using a versatile Cartesian grid method*, Department of Mechanical Engineering & Materials Science, Washington University in St. Louis, St. Louis, MO, Mar. 3, 2022

I.9. *Learning from nature: Odor-guided navigation of flying insects*, Autonomous and Intelligent Robotics Laboratory, Lehigh University, Virtual Seminar, Oct. 29, 2021

I.10. *Effects of wing-induced flow on odor plume structures*, Odor2Action IRG3 Meeting, Department of Civil, Environmental and Architectural Engineering, University of Colorado Boulder, Virtual Seminar, Oct. 11, 2021

I.11. *Wing-induced flow in odor-guided flapping flight*, Intelligent and Bio-inspired Mechanics (IBiM) Seminar Series, Department of Mechanical and Material Engineering, Queen's University, Virtual Seminar, Apr. 14, 2021

I.12. *CFD validation of nasal airflow under various breathing condition*, Society for Computational Fluid Dynamics of the Nose & Airway (SCONA), Chicago, IL, Jul. 5, 2019

I.13. *Wake structures and flow separation of rotating plates at low Reynolds number*, AIAA Aviation Massively-Separated Flows Discussion Group (MSFDG), Atlanta, GA, Jun. 25, 2018.

I.14. *Effect of induced airflow on odor plume transportation in a fruit fly in forward flight*, Polak Award Lecture, 39th AChemS Annual Meeting, Bonita Springs, FL, Apr. 28, 2017.

I.15. *Three-dimensional wake topology and flow analysis of bio-inspired locomotion*, The Ohio State University, Columbus, OH, Feb. 23, 2016.

TEACHING

Instructor – Case Western Reserve University (Aug. 2024 – Present)

- EMAE 471 – Computational Fluid Dynamics (16 students) 2025 Spring
- EMAE 251 – Thermodynamics (107 students) 2025 Spring
- EMAE 252 – Fluid Mechanics (100 students) 2024 Fall

Instructor – Villanova University (Aug. 2018 – May 2024)

- ME 3100 - Thermodynamics (32 students) 2024 Spring
- ME 3950 - Heat Transfer (65 students) 2023 Fall
- ME 8038 - Advanced Computational Fluid Dynamics (11 students) 2023 Spring
- ME 3950 - Heat Transfer (51 students) 2022 Fall
- ME 3100 - Thermodynamics (23 students) 2022 Spring
- ME 3100 - Thermodynamics (78 students) 2021 Spring
- ME 3950 - Heat Transfer (50 students) 2020 Fall
- ME 3100 - Thermodynamics (72 students) 2020 Spring
- ME 3950 - Heat Transfer (69 students) 2019 Fall
- ME 3100 - Thermodynamics (72 students) 2019 Spring
- ME 3950 - Heat Transfer (73 students) 2018 Fall

Teaching Assistant – University of Virginia (Aug. 2013 – May 2016)

- MAE 2100 - Thermodynamics 2016 Spring
- MAE 2300 - Engineering Mechanics-Statics 2015 Fall
- MAE 6710 - Finite Element Analysis 2015 Spring
- APMA 3080 - Linear Algebra 2014 Fall
- APMA 2130 - Ordinary Differential Equations 2014 Spring
- MAE 2010 - Introduction to Aerospace Engineering 2013 Fall

ADVISING & MENTORING

Research Advisees

Postdoc Researcher:

- **Desta Tewolde** (2025 - Present)

Ph.D Students:

- **Yiding Feng** (2024 - Present)
- **Naeem Haider** (2023 - Present)
- **Seth Lionetti** (2022 - Present)
- **Zhipeng Lou** (2021 - Present)
- **Menglong Lei** (2019 - 2023), Post-Grad: Postdoc at University of Virginia

Master's Students:

- **Connor Reilly** (2024 - Present), co-advised with Kathryn Daltorio
- **Maham Kamran** (2025 Spring), Visiting Master Student from Lakehead University, Canada
- **Paul Bakare** (2022 - 2024), Post-Grad: Senior Associate Engineer at L3 Harris Technologies
- **Seth Lionetti** (2021 - 2022), Post-Grad: Ph.D. student at Villanova University

Undergraduate Research Assistants:

- **Carlos Blanes Canudas** (2025 Spring), class of 2027
- **Michael Gillin** (2022 - 2023), class of 2025
- **Julia Lamparello** (2022 - 2023), class of 2025
- **Kaya Robinson** (2021), class of 2024
- **Paul Bakare** (2021 - 2022), Post-Grad: M.S. student at Villanova University
- **Karoline Menze** (2020), Post-Grad: Engineer at Johnson Matthey
- **Sebastian DiStefano** (2020), Post-Grad: Engineer at L3 Harris
- **Seth Lionetti** (2019 - 2021), Post-Grad: M.S. student at Villanova University
- **Michael Corbi** (2019), Post-Grad: MBA at Villanova University

Advisees' Awards

- **Zhipeng Lou**, AIAA Flow Visualization Showcase (1st Place), AIAA AVIATION Forum, 2023
- **Menglong Lei**, ASME Lewis F. Moody Award, ASME Fluids Engineering Division, 2022
- **Seth Lionetti**, Villanova Departmental MS Award, 2022.
- **Menglong Lei**, ASME FEDSM Best Technical Presentation Award (1st place), 2021
- **Menglong Lei**, ASME FEDSM Best Paper Award, 2021
- **Menglong Lei**, ASME Graduate Student Scholarship, 2021.
- **Seth Lionetti**, Villanova Mechanical Engineering Research Award, 2021.
- **Seth Lionetti**, Villanova Undergraduate Research Fellowship, 2020.

Advisees' Dissertation/Thesis

- **Menglong Lei**, "Unsteady Aerodynamics and Odorant Transport in Odor-Guided Flapping Flights," PhD Dissertation, Villanova University, 2023

- **Seth Lionetti**, "Computational Investigation of Biological Propulsion Systems at Low Reynolds Numbers," Master's Thesis, Villanova University, 2022.

UNIVERSITY SERVICES

Dissertation/Thesis Committee

Ph.D. Dissertation:

- 2025, Gauresh Jassal, PhD, "*On high spatial resolution velocimetry in fluid flows using optical flow*," Mechanical & Aerospace Engineering, Case Western Reserve University
- 2024, Ruishu Jin, PhD, "*A Numerical Study on the Flapping-Wing Aerodynamics and Vortex Dynamics*," School of Engineering and Technology, University of New South Wales (Australia)
- 2024, Qifu Wang, PhD, "*Biomimetic Study of Brian Concussion*," Mechanical Engineering, Villanova University
- 2023, Menglong Lei, PhD, "*Unsteady Aerodynamic and Odorant Transport in Odor-Guided Flapping Flights*," Mechanical Engineering, Villanova University

M.S. Thesis:

- 2024, Maxwell Song, MS, "*Particle Shadow Velocimetry and its Potential Applications and Advantages vis-à-vis Particle Image Velocimetry*," Mechanical and Aerospace Engineering, Case Western Reserve University
- 2022, Seth Lionetti, MS, "*Computational Investigation of Biological Propulsion Systems at Low Reynolds Numbers*," Mechanical Engineering, Villanova University

EMAE Undergraduate Studies Committee (2024-present), Case Western Reserve University: As a member of the Undergraduate Studies Committee, I collaborate with colleagues to evaluate and improve the undergraduate curriculum, ensuring it meets academic standards and fosters student success.

EMAE Web-master (2024-present), Case Western Reserve University: As Webmaster, I work closely with the department chair to maintain and develop webpage features that effectively disseminate and highlight the EMAE department's achievements.

High-Performance Computing Committee Member (2019-2024), College of Engineering, Villanova University

PROFESSIONAL SERVICES

American Physical Society (APS)

- Section Chair, A05: Collective Behavior and Active Matter I: Fish schooling (Nov. 2024)
- Section Chair, A35: Biofluids: Flying Insects (Nov. 2023)
- Section Chair, L04: Animal Flight: Flying Insects II (Nov. 2022)

American Society of Mechanical Engineers (ASME)

- Vice Chair, ASME Fluids Engineering Division (FED), Computational Fluid Dynamics Technical Committee (CFDTC), August 2024 – Present.
- Secretary, ASME Fluids Engineering Division (FED), Computational Fluid Dynamics Technical Committee (CFDTC), Aug. 2022 – Aug. 2024.
- Section Chairs, CFD Applications for Optimization and Control, ASME IMECE (Nov. 2024)
- Section Chairs, CFD Development; Fluid-Structure Interaction, ASME FEDSM (Aug. 2024)
- Section Chair, Computational Modeling in Swimming and Flying, ASME FEDSM (Aug. 2022)
- Section Chair, Fluid Structure Interaction, ASME FEDSM (Aug. 2021)
- Section Chair, Fluid Structure Interaction: Biological Applications, ASME AJK Fluids (Jul. 2019)

American Institute of Aeronautics and Astronautics (AIAA)

- Senior Member (2023-), Member (2014-2023)
- Associate Organizer of AIAA Aviation Meeting, Fluid Dynamics (June 2017)
- Section Chair, FD-20: Low-*Re* Flows and Bio-inspired Flows (June 2017)
- Section Chair, FD-13: Boundary Layer Stability and Transition (June 2017)

Grant Reviewer

- NSF panel (2020, 2021, 2024, 2025)
- Oak Ridge Associated Universities (2021)

Editorial Board

- International Journal of Micro Air Vehicles (2021-present)
- Guest editor, Special Issue: Numerical Simulations of Biological Flow, Journal of Mechanical Engineering Science (2019-2020)

Ad-hoc Reviewer

- AIAA Journal
- Bioinspiration & Biomimetics
- Biomedical Physics & Engineering Express
- Energies
- Fluids
- International Forum of Allergy & Rhinology
- International Journal of Micro Air Vehicles
- International Journal for Numerical Methods in Biomedical Engineering
- Journal of Aerospace Engineering
- Journal of Fluids Engineering
- Journal of Fluids and Structures
- Ocean Engineering
- PLOS One
- Physics of Fluids
- Physical Review E

- Progress in Computational Fluid Dynamics
- ReScience
- Scientific Reports

Conference Reviewer

- ASME IMECE Conference Papers (2023, 2024, 2025)
- ASME FEDSM Conference Papers (2021, 2022, 2023, 2024, 2025)
- AIAA Aviation Conference Papers (2020, 2024)
- ASME AJK Fluids Conference Papers (2019)
- AIAA SciTech Conference Papers (2018, 2020, 2022, 2024)

PROFESSIONAL MEMBERSHIPS

- American Physical Society (APS)
- American Institute of Aeronautics and Astronautics (AIAA)
- American Society of Mechanical Engineers (ASME)
- Association for Chemoreception Sciences (AChemS)
- American Rhinologic Society (ARS)