

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

Villanova University , Villanova, PA Assistant Professor Department of Mechanical Engineering	2018 – Present
The Ohio State University , Columbus, OH Postdoctoral Researcher Wexner Medical Center (Advisor: Kai Zhao)	2016 – 2018

EDUCATION

University of Virginia , Charlottesville, VA Ph.D. in Mechanical and Aerospace Engineering Dissertation: Computational Investigation of Vortex Dynamics and Aerodynamic Performance in Flapping Propulsion (Advisor: Haibo Dong)	2016
University of Virginia , Charlottesville, VA 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)	2014
Dalian Jiaotong University , Dalian, China B.S. in Mechanical Engineering	2010

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** **02/01/2024 – 01/31/2027**
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-2120505** **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-2042368** **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 Obstruction 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. 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.2. 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.3. 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.4. 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.5. 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.6. **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.7. Menglong Lei and **Chengyu Li**†, “The aerodynamic performance of passive wing pitch in hovering flight,” Physics of Fluids 32, 051902 (2020).
[[Featured Article](#)]
- J.8. **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.9. **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.10. 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.11. 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.12. **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.13. 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.14. 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.15. 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.16. 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.17. 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.18. **Chengyu Li**, Haibo Dong, Kai Zhao, “*A balance between aerodynamic and olfactory performance during flight in Drosophila,*” *Nature Communications* 9, 3215 (2018).

- J.19. **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.20. **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.21. Lauren Eichaker, **Chengyu Li**, Nakesha King, Victoria Pepper, Cameron Best, Ekene Onwuka, Eric Heuer, Kai Zhao, Jonathan Grischkan, Christopher Breuer, Jed Johnson, and Tendency Chiang, “*Quantification of tissue engineered trachea performance with computational fluid dynamics,*” *The Laryngoscope* 128, E272-E279 (2018).
- J.22. 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.23. 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.24. **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.25. **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.26. **Chengyu Li** and Haibo Dong, “*Wing kinematics measurement and aerodynamics of a dragonfly in turning flight,*” *Bioinspiration & Biomimetics* 12, 026001 (2017).
- J.27. 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.28. 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.29. **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.30. 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.31. **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.32. 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.33. Zhipeng Lou, Menglong Lei, Haibo Dong, and **Chengyu Li**[†], “*Wing-antenna interaction enhances odor perception in odor-tracking flapping flight*.”
- J.34. Menglong Lei, John Crimaldi, and **Chengyu Li**[†], “*Effects of flapping kinematics on modulating odor plume structures at low Reynolds numbers*.”

CONFERENCE PAPERS

- C.1. 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.2. 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.3. Zhipeng Lou and **Chengyu Li**[†], “*Unsteady aerodynamics and wake structures of butterfly in forward flight*” AIAA Aviation, San Diego, California, June, 2023.

- C.4. 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.5. 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.6. 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.7. Alec Menzer, **Chengyu Li**, Frank Fish, Yuchen Gong, and Haibo Dong “*Modeling and computation of batoid swimming inspired pitching impact on wake structure and hydrodynamic performance*,” ASME FEDSM, Toronto, Canada, August, 2022.
- C.8. 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.9. 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.10. Menglong Lei and **Chengyu Li**[†], “*Numerical investigation of passive pitching mechanism in odor-tracking flights*,” AIAA Aviation, Virtual Meeting, June 2020.
- C.11. **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.12. 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.13. 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.14. **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.15. **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.16. **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.17. **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.18. **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.19. **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.20. 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, 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.2. 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.3. 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.4. 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.5. 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.6. Menglong Lei and **Chengyu Li**, “*Unsteady aerodynamics and odorant transport in an upwind surging flight of Drosophila*,” 75th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Indianapolis, Indiana, November 2022.
- P.7. 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.8. Zhipeng Lou, Adrian Herrera-Amaya, Margaret Byron, **Chengyu Li**, “*Hydrodynamics of metachronal rowing at low-to-intermediate Reynolds numbers*,” 75th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Indianapolis, Indiana, November 2022.
- P.9. 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.10. 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.11. 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.12. 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.13. 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.14. 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.15. **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.16. 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.17. **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.18. **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.19. **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.20. 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.21. 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.22. 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.23. **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.24. **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.25. **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.26. 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.27. 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.28. 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.29. 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.30. **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.31. **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.32. **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.33. **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.34. 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.35. 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.36. 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.37. 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.38. 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.39. 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.40. 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.41. 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.42. 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.43. 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.44. **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.45. **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.46. 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.47. 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.48. **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. *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.2. *Image-based computational modeling of biological fluid systems*, Department of Mechanical and Aerospace Engineering, North Carolina State University, Feb. 28, 2023
- I.3. *Computational modeling of biological and physiological flows using a versatile Cartesian grid method*, University of Delaware, Feb. 24, 2023
- I.4. *High-fidelity computational modeling of biological fluid systems*, Department of Mechanical Engineering, University of Houston, Feb. 3, 2023
- I.5. *Image-based computational modeling of biological fluid systems*, Department of Mechanical and Aerospace Engineering, Case Western Reserve University, Nov. 18, 2022
- I.6. *Odor-guided flapping flight: How do the flapping kinematics modulate the odor landscape?* ASME Fluids Engineering Division, Online Seminar Series, Jun. 8, 2022
- I.7. *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.8. *Learning from nature: Odor-guided navigation of flying insects*, Autonomous and Intelligent Robotics Laboratory, Lehigh University, Virtual Seminar, Oct. 29, 2021
- I.9. *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.10. *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.11. *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.12. *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.13. *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.14. *Three-dimensional wake topology and flow analysis of bio-inspired locomotion*, The Ohio State University, Columbus, OH, Feb. 23, 2016.

TEACHING

Instructor – Villanova University (Aug. 2018 – Present)

- | | |
|---|-------------|
| • 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)

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|--|-------------|
| • 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

Ph.D Students:

- **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:

- **Paul Bakare** (2022 - Present)
- **Seth Lionetti** (2021 - 2022), Post-Grad: Ph.D. student at Villanova University

Undergraduate Research Assistants:

- **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.

PROFESSIONAL SERVICES

American Physical Society (APS)

- Section Chair, A35: Biofluids: Flying Insects (November 2023)
- Section Chair, L04: Animal Flight: Flying Insects II (November 2022)

American Society of Mechanical Engineers (ASME)

- Vice Chair, ASME Fluids Engineering Division (FED), Computational Fluid Dynamics Technical Committee (CFDTC), August 2022– Present.
- Section Chair, Computational Modeling in Swimming and Flying, ASME FEDSM (August 2022)
- Section Chair, Fluid Structure Interaction, ASME FEDSM (August 2021)
- Section Chair, Fluid Structure Interaction: Biological Applications, ASME AJK Fluids (July 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)
- 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

Conference Reviewer

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

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)