

# Chengyu Li

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## RESEARCH INTERESTS

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

## EDUCATION

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**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

## APPOINTMENTS

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

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

## HONORS & AWARDS

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- **ASME Lewis F. Moody Award**, ASME Fluids Engineering Division, 2022
- **NSF Faculty Early Career Development Program (CAREER) Award**, 2021

- **ASME Fluids Engineering Division Summer Meeting (FEDSM) Best Paper Award**, 2021
- **Ralph E. Powe Junior Faculty Enhancement Award**, Oak Ridge Associated Universities (ORAU), 2019
- **2<sup>nd</sup> prize of the ASME Flow Visualization Competition**, ASME AJK Fluids, 2019
- **Polak Young Investigator Award**, The 39<sup>th</sup> annual meeting of Association for Chemoreception Sciences (AChemS), 2017
- **Outstanding Ph.D. Research Presentation Award**, University of Virginia, 2017

## FUNDING

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- **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

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- 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

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### *Achieved Journals*

- J.1. 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.2. 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.3. **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.4. Menglong Lei and **Chengyu Li**, “*The aerodynamic performance of passive wing pitch in hovering flight,*” *Physics of Fluids* 32, 051902 (2020).  
[\[Featured Article\]](#)
- J.5. **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.6. **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.7. 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.8. 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.9. **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.10. 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.11. 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.12. 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.13. 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.14. 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.15. **Chengyu Li**, Haibo Dong, Kai Zhao, “*A balance between aerodynamic and olfactory performance during flight in Drosophila*,” *Nature Communications* 9, 3215 (2018).
- J.16. **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.17. **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.18. 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.19. 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.20. 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.21. **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.22. **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.23. **Chengyu Li** and Haibo Dong, “*Wing kinematics measurement and aerodynamics of a dragonfly in turning flight*,” *Bioinspiration & Biomimetics* 12, 026001 (2017).
- J.24. 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.25. 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.26. **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.27. 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.28. **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.29. 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.30. Seth Lionetti, Zhipeng Lou, Adrian Herrera-Amaya, Margaret Byron, and **Chengyu Li**, “*Vortex dynamics and new propulsion enhancement mechanism in metachronal rowing at intermediate Reynolds numbers*.”
- J.31. Zhipeng Lou, Menglong Lei, Haibo Dong, and **Chengyu Li**, “*Effects of wing-induced flow on the odor plume structures in an upwind surging flight of monarch butterfly*.”

- J.32. Menglong Lei and **Chengyu Li**, “*A balance between odor intensity and odor perception range in odor-guided flapping flight.*”

## CONFERENCE PAPERS

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- C.1. 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.2. 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.3. 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.4. 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.5. 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.6. Menglong Lei and **Chengyu Li**, “*Numerical investigation of passive pitching mechanism in odor-tracking flights,*” AIAA Aviation, Virtual Meeting, June 2020.
- C.7. **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.8. 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.9. Junshi Wang, **Chengyu Li**, Yan Ren, and Haibo Dong, “*Effect of surface morphing on the wake structure and performance of flapping plates,*” 47<sup>th</sup> AIAA Fluid Dynamics Conference and Exhibit, Denver, Colorado, June 2017.
- C.10. **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,*” 47<sup>th</sup> AIAA Fluid Dynamics Conference and Exhibit, Denver, Colorado, June 2017.

- C.11. **Chengyu Li**, Junshi Wang, and Haibo Dong, “*Proper orthogonal decomposition analysis of flapping hovering wings*,” 55<sup>th</sup> AIAA Aerospace Sciences Meeting, Gaylord, Texas, January 2017.
- C.12. **Chengyu Li** and Haibo Dong, “*Quantification and analysis of propulsive wake topologies in finite aspect-ratio pitching-rolling plates*,” 46<sup>th</sup> AIAA Fluid Dynamics Conference and Exhibit, Washington D.C., June 2016.
- C.13. **Chengyu Li**, Haibo Dong, and Zongxian Liang, “*Proper orthogonal decomposition analysis of 3-D wake structures in a pitching-rolling plate*,” 54<sup>th</sup> AIAA Aerospace Sciences Meeting, San Diego, California, January 2016.
- C.14. **Chengyu Li**, Haibo Dong, and Yan Ren, “*A numerical study of flapping plates hinged with a trailing-edge flap*,” 32<sup>nd</sup> AIAA Applied Aerodynamics Conference, Atlanta, Georgia, June 2014.
- C.15. **Chengyu Li** and Haibo Dong, “*Wake structure and aerodynamic performance of low aspect-ratio revolving plates at low Reynolds number*,” 52<sup>nd</sup> AIAA Aerospace Sciences Meeting, National Harbor, Maryland, January 2014.
- C.16. Hui Wan, Haibo Dong, **Chengyu Li**, and Zongxian Liang, “*Vortex formation and aerodynamic force of low aspect-ratio plate in translation and rotation*,” 42<sup>nd</sup> AIAA Fluid Dynamics Conference and Exhibit, New Orleans, Louisiana, June 2012.

## PRESENTATIONS & POSTERS

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- P.1. Menglong Lei and **Chengyu Li**, “*Unsteady aerodynamics and odorant transport in an upwind surging flight of *Drosophila**,” 75<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Indianapolis, Indiana, November 2022.
- P.2. Seth Lionetti, Tyson Hedrick, **Chengyu Li**, “*Effects of flight speed on olfactory sensitivity in upwind surging flights of a hawkmoth*,” 75<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Indianapolis, Indiana, November 2022.
- P.3. Zhipeng Lou, Adrian Herrera-Amaya, Margaret Byron, **Chengyu Li**, “*Hydrodynamics of metachronal rowing at low-to-intermediate Reynolds numbers*,” 75<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Indianapolis, Indiana, November 2022.
- P.4. Seth Lionetti, Zhipeng Lou, Adrian Herrera-Amaya, Margaret Byron, **Chengyu Li**, “*Effects of substrate geometry on the hydrodynamics of ciliary propulsion*,” 74<sup>th</sup> Annual Meeting of

- the American Physical Society (APS) Division of Fluid Dynamics, Phoenix, Arizona, November 2021.
- P.5. 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*,” 74<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Phoenix, Arizona, November 2021.
- P.6. 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?*” 73<sup>rd</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Virtual, November 2020.
- P.7. Karoline Menze, Pan Liu, Bo Cheng, **Chengyu Li**, “*Unsteady flow and force control for flies landing upside down on a ceiling*,” 73<sup>rd</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Virtual, November 2020.
- P.8. Seth Lionetti, Tyson Hedrick, **Chengyu Li**, “*Wing kinematics and unsteady aerodynamics of hawkmoth in hovering and forward flight*,” 73<sup>rd</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Virtual, November 2020.
- P.9. Yun Liu, **Chengyu Li**, Angel Lozano, “*Vortex structure comparison between experimental and computational studies on a hovering hawkmoth*,” 73<sup>rd</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Virtual, November 2020.
- P.10. **Chengyu Li**, Michael Corbi, Tyson Hedrick, “*Why are long sequences of steady flight less common at higher speeds of forward flight in Hawkmoth?*” 72<sup>nd</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Seattle, Washington, November 2019.
- P.11. Menglong Lei and **Chengyu Li**, “*Effect of torsional stiffness on passive wing pitch and its aerodynamic performance in hovering flight*,” 72<sup>nd</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Seattle, Washington, November 2019.
- P.12. **Chengyu Li**, Haibo Dong, Kai Zhao, “*Dual functions of insect wings: balancing aerodynamics and olfaction*,” 71<sup>st</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Atlanta, Georgia, November 2018.
- P.13. **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 64<sup>th</sup> Annual Meeting, Atlanta, Georgia, October 2018.



- P.14. **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.15. 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.16. 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.17. 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.18. **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.19. **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.20. **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.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?*,” Combined Otolaryngology Spring Meetings (COSM), National Harbor, Maryland, April 2018.
- P.22. Kun Jia, Minjun Wei, Min Xu, **Chengyu Li**, and Haibo Dong, “*An adjoint approach to study a flexible flapping wing in pitching-rolling motion?*,” 70<sup>th</sup> Annual Meeting of the

- American Physical Society (APS) Division of Fluid Dynamics, Denver, Colorado, November 2017.
- P.23. 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.24. 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 63<sup>rd</sup> Annual Meeting, Chicago, Illinois, September 2017.
- P.25. **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 63<sup>rd</sup> Annual Meeting, Chicago, Illinois, September 2017.
- P.26. **Chengyu Li**, Haibo Dong, and Bo Cheng, “*Effects of aspect ratio on tip vortex structures and power reduction in revolving wings*,” 2<sup>nd</sup> biennial Flow Visualization Event, Denver, Colorado, June 2017.
- P.27. **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.28. **Chengyu Li**, Alexander Farag, James Leach, Bhakthi Deshpande, Adam Jacobowitz, Kanghyun Kim, Bradley Otto, Kai Zhao, “*Computational and trigeminal examinations of empty nose syndrome*,” 39<sup>th</sup> AChemS Annual Meeting, Bonita Springs, Florida, April 2017.
- P.29. 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*,” 39<sup>th</sup> AChemS Annual Meeting, Bonita Springs, Florida, April 2017.
- P.30. 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*,” 39<sup>th</sup> AChemS Annual Meeting, Bonita Springs, Florida, April 2017.

- P.31. 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.32. 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.33. 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.34. Geng Liu, **Chengyu Li**, Haibo Dong, and George Lauder, “*Dynamic surface morphing of sunfish caudal fin enhances its propulsive efficiency in steady swimming,*” 68<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Boston, Massachusetts, November 2015.
- P.35. 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, 68<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Boston, Massachusetts, November 2015.
- P.36. 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.37. Geng Liu, **Chengyu Li**, Haibo Dong, and George Lauder, “*On the chordwise and spanwise flexibilities of fish fin during free swimming,*” 51<sup>st</sup> Annual Technical Meeting of the Society of Engineering Science, Purdue University, West Lafayette, Indiana, October 2014.
- P.38. Geng Liu, **Chengyu Li**, and Haibo Dong, “*Does dragonfly’s abdomen flexion help with fast turning maneuvers?*” 66<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Pittsburgh, Pennsylvania, November 2013.
- P.39. **Chengyu Li**, Haibo Dong, and Wen Zhang, “*Flying with abrupt wing flapping: Damselfly in darting flight,*” Video Gallery of Fluid Motion, 66<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Pittsburgh, Pennsylvania, November 2013.

- P.40. **Chengyu Li**, Haibo Dong, Wen Zhang, and Kuo Gai, “*Flow modulation and force control in insect fast maneuver*,” 65<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, San Diego, California, November 2012.
- P.41. Haibo Dong, **Chengyu Li**, Zongxian Liang, and Xiang Yun, “*Unsteady flow and force control in butterfly take-off flight*,” Video Gallery of Fluid Motion, 65<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, San Diego, California, November 2012.
- P.42. 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, 64<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Baltimore, Maryland, November 2011.
- P.43. **Chengyu Li**, Haibo Dong, and Samane Zeyghami, “*Role of wing/body flexibility in insect maneuver*,” 64<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Baltimore, Maryland, November 2011.

## INVITED TALKS

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- I.1. *Image-based computational modeling of biological fluid systems*, Department of Mechanical and Aerospace Engineering, Case Western Reserve University, Nov. 18, 2022
- I.2. *Odor-guided flapping flight: How do the flapping kinematics modulate the odor landscape?* ASME Fluids Engineering Division, Online Seminar Series, Jun. 8, 2022
- I.3. *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.4. *Learning from nature: Odor-guided navigation of flying insects*, Autonomous and Intelligent Robotics Laboratory, Lehigh University, Virtual Seminar, Oct. 29, 2021
- I.5. *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.6. *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.7. *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.8. *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.9. *Effect of induced airflow on odor plume transportation in a fruit fly in forward flight*, Polak Award Lecture, 39<sup>th</sup> AChemS Annual Meeting, Bonita Springs, FL, Apr. 28, 2017.
- I.10. *Three-dimensional wake topology and flow analysis of bio-inspired locomotion*, The Ohio State University, Columbus, OH, Feb. 23, 2016.

## TEACHING

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**Instructor** – Villanova University (Aug. 2018 – Present)

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|---|-------------|
| • ME 8038 - Advanced Computational Fluid Dynamics | 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

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**Current Members:**

- **Seth Lionetti**, Graduate research assistant, Ph.D. student (2022 - Present)
- **Zhipeng Lou**, Graduate research assistant, Ph.D. student (2021 - Present)
- **Menglong Lei**, Graduate research assistant, Ph.D. student (2019 - Present)
- **Paul Bakare**, Graduate research assistant, M.S. student (2021 - Present)
- **Michael Gillin**, Undergraduate research assistant, B.S. student (2022 - Present)
- **Julia Lamparello**, Undergraduate research assistant, B.S. student (2022 - Present)

**Past Members:**

- **Seth Lionetti**, Graduate research assistant, M.S. student (2021 - 2022)
- **Seth Lionetti**, Undergraduate research assistant, B.S. student (2019 - 2021)
- **Paul Bakare**, Undergraduate research assistant, B.S. student (2021 - 2022)
- **Kaya Robinson**, Undergraduate research assistant, B.S. student (2021)
- **Karoline Menze**, Undergraduate research assistant, B.S. student (2020)
- **Sebastian DiStefano**, Undergraduate research assistant, B.S. student (2020)
- **Michael Corbi**, Undergraduate research assistant, B.S. student (2019)

**STUDENTS' AWARDS**

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- **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 (1<sup>st</sup> 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.

**PROFESSIONAL SERVICES**

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**American Physical Society (APS)**

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

**American Society of Mechanical Engineers (ASME)**

- Secretary, 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)**

- 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**

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

**PROFESSIONAL MEMBERSHIPS**

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- 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)