Venkatesh Pulletikurthi
PhD Candidate
School of Mechanical Engineering
Purdue University
West Lafayette, IN 47906

Education

08/2017 - today

Doctor of Philosophy GPA: 3.91/4.0
School of Mechanical Engineering
Purdue University
Advisor: Prof. Luciano Castillo

01/2019 - 12/2021

Graduate Teaching and Learning Certificate GPA: 4.0/4.0
School of Engineering Education
Purdue University

07/2012 - 06/2016

Bachelors of Technology (B.Tech Hons.) in Mechanical Engineering GPA: 8.8/10.0
Minor in Industrial Engineering

Indian Institute of Technology Madras
Advisor: Dr. Arul K. Prakash

Research interests

My research interests focus on the integration of fundamental understanding of turbulence to technological advancement in energy, defense, and pollution control areas. For the same, I am interested to implement my analytical, numerical and experimental skills to turbulence-related projects in high Reynolds number and compressible flows and also, expanding my skill set to the application of neural networks in fluid dynamics-related problems.

Awards

Purdue-UIUC Senior PhD Teaching Exchange Fellow - 2021 — **Spring 2022**

Research experience

Upstream perturbations effect on large-scale features in turbulence wall-bounded flows — **07/2017 - today**
Advisor: Prof. Luciano Castillo
School of Mechanical Engineering
Purdue University

In this work, it is demonstrated that jet spacing and diameter are essential to influence large-scale features of turbulence and heat transfer can be enhanced with jets at upstream rather placing jets all over the airfoil.
Impact: 2 peer-reviewed Journal publications (Phys. Fluids (under review) and MDPI Fluids 2018) and 1 European turbulence conference proceeding (Publisher: Springer 2018)

Turbulent statistics in subsonic and transonic open channel flow with a contraction — **04/2019 - today**
Advisors: Prof. Luciano Castillo & Dr. Carlo Scalo
School of Mechanical Engineering
Purdue University

Transonic flow often occurs during commercial aeroplanes take-off and landings which leads to flow separation. The flow separation dynamics under transonic flow conditions is not publicly available in the literature. In this work, separation bubble dynamics is studied for transonic flow conditions created in channel flow with sinusoidal contraction.
Impact: APS - Division of Fluid Dynamics conference presentation in the years 2019 and 2020

Interchangeable filter characterization for COVID-19 protection — **05/2019 - today**
Advisor: Prof. Luciano Castillo
School of Mechanical Engineering
Purdue University

A novel filter, HyCu, is designed for better breathability upto 15% compared to KN95 mask without compromising on virus filtering efficiency.
Impact: APS - DFD conference presentation in 2020 and 1 Peer reviewed Journal Publication (under review)

Professional societies

- Member, American Physical Society (APS) 2017-today
- Member, American Society of Mechanical Engineers (ASME) 2018-today

Professional services

- Reviewer, Physics of Fluids - AIP Publishing
- Reviewer, Journal of Fluid Mechanics

Contact

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Google Scholar

Academia.edu

Surface topology impact on wind power generation and energy entrainment — 08/2020 - today

Advisor: Prof. Luciano Castillo
School of Mechanical Engineering
Purdue University

Wind speeds vary substantially over different terrains and create significant dynamic changes to wind turbines and also, it varies the wind power generation significantly. The impact of surface topology on large-scales and energy entrainment for wind power generation is studied experimentally for various heights and placement of wind turbines and the large-scale features of turbulence are extracted using proper-orthogonal decomposition to study the energy entrainment.
Impact: 1 conference presentations (APS-DFD 2021)

Effects of synthetic low-level jet (LLJ) on the wind power generation — 04/2019 - 04/2021

Advisor: Prof. Luciano Castillo
School of Mechanical Engineering
Purdue University

A world-wide wind phenomenon, LLJ, occurs primarily in the night which has significantly higher wind speeds than atmospheric boundary layer. Atmospheric phenomenon is created in wind tunnel under controlled conditions and the impact of LLJs on wind farm and optimum height are studied experimentally.
Impact: 1 peer-reviewed Journal publication (JRSE 2020) and 2 conference presentations (APS-DFD 2020 and ETC 2019)

Study of Momentum and Thermal Wakes Due to Elliptic Cylinders of Various Axes Ratios Using the Immersed Boundary Method — 06/2019 - 07/2020

Advisor: Dr. Arul. K. Prakash
Department of Mechanical Engineering
Indian Institute of Technology Madras

Immersed boundary method (IBM) for simulating momentum and thermal wakes generated by elliptic cylinders. We consider elliptic cylinders of five different axis ratios (AR = 0.1, 0.4, 0.6, 0.8, 1.0) within a Reynolds number range where the flow was reported to be two-dimensional. We employ a direct forcing immersed boundary method to simulate wakes behind these cylinders.
Impact: Book chapter in Springer 2020

On the development of low frequency structures in near and far laminar wakes — 06/2015 - 07/2019

Advisor: Dr. Arul. K. Prakash
Department of Mechanical Engineering
Indian Institute of Technology Madras

Flow past any geometry contains structures of diverse sizes, albeit the shedding structure is the most prevalent. There are situations where the flow also has large-scale secondary dominant structures. This study attempts to provide the sources of such low frequency secondary structures in a laminar regime.
Impact: 1 peer reviewed Journal Publication (Phys. Fluids 2019)

Analysis and characterisation of momentum and thermal wakes of elliptic cylinders — 06/2015 - 07/2016

Advisor: Dr. Arul. K. Prakash
Department of Mechanical Engineering
Indian Institute of Technology Madras

Laminar near wakes of an elliptic cylinder are studied extensively for their similarities to real world applications in aerospace and ground transport. In this work, the far wake charateristics and the instabilities which led to the formation of secondary vortex street and its thermal characteristics is studied.
Impact: 1 peer reviewed Journal Publication (JFM 2016)

Teaching and Mentoring experience

On the role of wind turbines in CO_2 sequestration — **05/2021 - today**

Advisor: Prof. Luciano Castillo
School of Mechanical Engineering
Purdue University

Ideated and mentoring a master student to study wind turbines role in increasing local concentration of CO_2 to reduce global warming. National Renewable Energy Laboratory's (NREL) wind farm code, SOWFA, is adapted to simulate mass transport equation and local concentration and entrainment flux of CO_2 is being investigated.
Impact: APS - DFD conference presentation in 2021

Low-order modeling of medical images for early detection of brain abnormalities — **05/2021 - today**

Advisor: Prof. Luciano Castillo
School of Mechanical Engineering
Purdue University

Mentoring a junior PhD student on implementing proper orthogonal decomposition, widely used in turbulence, to extract abnormal features and developing algorithms for early detection of brain ailments such as tumors using artificial neural networks

Teaching assistant for ME 315 - Heat And Mass Transfer — **08/2021 - 12/2021**

Instructors: Prof. Thomas Edwin Beechem, Prof. Partha P. Mukherjee, Prof. Xiulin Ruan, Dr. David M. Warsinger, Prof. Justin A Weibel, & Prof. Xianfan Xu
School of Mechanical Engineering
Purdue University

Impact: Using flipped lecture method, I am focusing on discussing the approach to solve problems from fundamental perspective in a video and utilizing the office hours to clarify doubts by engaging students on the concepts.

Co-Teaching instructor for Engineering Research and Design module — **06/2021-07/2021**

Instructor: Prof. Luciano Castillo
Minority Engineering Program - Summer School 2021
Purdue University

Impact: Designed and implemented a hands-on wind turbine creation project for high school students amidst difficulties during COVID-19 pandemic

Teaching assistant for ME 581 - Numerical Methods In Mechanical Engineering — **08/2020 - 12/2020**

Instructor: Prof. Marisol Koslowski
School of Mechanical Engineering
Purdue University

Impact: Designed final exam problem to reflect connectedness among students to the current pandemic using the numerical concepts learned through the course.

Teaching assistant for ME 263 - Introduction To Mechanical Engineering Design, Innovation And Entrepreneurship 01/2020 - 05/2020

Instructors: Dr. Martin Byung-Guk Jun & Dr. Morgan D Murphy
School of Mechanical Engineering
Purdue University

Impact: Adapted students to complete virtual online based learning from fully in-person lab sessions due to pandemic in the middle of semester.

Publications

Journal articles

- Pulletikurthi, V, Dharmarathne, S., Tutkun, M., Castillo, L. (2021). The effects of upstream perturbations on large-scale field and the proliferation of λ_2 vortices. Physics of Fluids, 33(10), 105122.
- Paul, I., Prakash, K. A., Vengadesan, S., & Pulletikurthi, V. (2016). Analysis and characterisation of momentum and thermal wakes of elliptic cylinders. *Journal of Fluid Mechanics*, 807, 303-323. *Citation count:17*
- Pulletikurthi, V, Paul, I., Prakash, K. A., & Prasad, B. (2019). On the development of low frequency structures in near and far laminar wakes. *Physics of Fluids*, 31(2), 023604. *Citation count:6*
- Doosttalab, A., Siguenza-Alvarado, D., Pulletikurthi, V, Jin, Y., Bocanegra Evans, H., Chamorro, L. P., & Castillo, L. (2020). Interaction of low-level jets with wind turbines: On the basic mechanisms for enhanced performance. *Journal of Renewable and Sustainable Energy*, 12(5), 053301. *Citation count:4*
- Dharmarathne, S., Pulletikurthi, V., & Castillo, L. (2018). Coherent vortical structures and their relation to hot/cold spots in a thermal turbulent channel flow. *Fluids*, 3(1), 14. *Citation count: 4*
- Pulletikurthi, V., Paul, I., Prakash, K. A., & Prasad, B. V. S. S. (2018). Spectral analysis of flow and scalar primitive variables in near and far laminar wake of an elliptic cylinder. *arXiv preprint arXiv:1807.03417*.

Book chapters

- Pulletikurthi, V., Dharmarathne, S., Hussain, F., Castillo, L. (2018, September). Influence of upstream perturbations on wall heat transfer via large-scale motions. In iTi Conference on Turbulence (pp. 99-104). *Springer, Cham*.
- Paul, I., Pulletikurthi, V., Arul Prakash, K., & Vengadesan, S. (2020). Study of Momentum and Thermal Wakes Due to Elliptic Cylinders of Various Axes Ratios Using the Immersed Boundary Method. In Immersed Boundary Method (pp. 317-333). *Springer, Singapore*.

Conferences

- Pulletikurthi, V., Redmond, J., Scalo, C., Castillo, L. (2021). Flow separation in a variable-area subsonic and transonic turbulent channel flow. Bulletin of the American Physical Society, 66.
- Pulletikurthi, V., Redmond, J., Scalo, C., Castillo, L. (2020). Turbulent statistics in subsonic and transonic open channel flow with a contraction. In *APS Division of Fluid Dynamics Meeting Abstracts* (pp. E10-008).
- Pulletikurthi, V., Scalo, C., Castillo, L. (2019, November). Flow mechanism at the interface layer of the bio-inspired coated surface in a turbulent channel flow. In *APS Division of Fluid Dynamics Meeting Abstracts* (pp. C26-004).

- Pulletikurthi, V., Dharmarathne, S., Hussain, F., Castillo, L. (2018). Relation of Large-scale motions with inlet blowing perturbations in turbulent wall-bounded flows. *Bulletin of the American Physical Society*, 63.
- Siguenza, D., Pulletikurthi, V., ODonnell, J., Nelson, C., Quinones, J., Cheng, S., ... Castillo, L. (2021). An Experimental Survey on the Interaction of Wind Turbines over Complex Terrain. Bulletin of the American Physical Society, 66.
- Nelson, C., Pulletikurthi, V., Siguenza, D., Velay-Lizancos, M., Ciri, U., Castillo, L. (2021). On the role of wind turbines in CO 2 sequestration. Bulletin of the American Physical Society, 66.
- Purwar, T., Esquivel-Puentes, H., Pulletikurthi, V., Li, X., Nelson, C., Ewura Aben Appiah, R., ... Blatchley, E. R. (2021). Interchangeable Filter For Virus Filtration and Inactivation. In APS Division of Fluid Dynamics Meeting Abstracts (pp. H01-001).
- Dharmarathne, S., Pulletikurthi, V., Tutkun, M., Castillo, L. (2018). Modulation of large-scale motions due to blowing and suction. *Bulletin of the American Physical Society*, 63.
- Purwar, T., Esquivel, A., Pulletikurthi, V., Castillo, L., Castano, V. (2020). Interchangeable filter characterization for COVID-19 protection. In *APS Division of Fluid Dynamics Meeting Abstracts* (pp. Y01-016).
- Doosttalab, A., Siguenza, D., O'Donnell, J., Gutierrez, W., Pulletikurthi, V., Jin, Y., ... Castillo, L. (2019, November). Positive effect of a synthetic low-level jet on the mean power and momentum transport of a wind-turbine array. In *APS Division of Fluid Dynamics Meeting Abstracts* (pp. L42-005).
- Siguenza, D., Doosttalab, A., O'Donnell, J., Gutierrez-Rodriguez, W., Pulletikurthi, V., Jin, Y., ... Castillo, L. (2018). Effect of a synthetic low-level jet on the mean power and momentum transport of a model wind-turbine arra. *Bulletin of the American Physical Society*, 63.

Leadership experience

Research and Scholarship Chair **05/2021 - today**

American Society for Engineering Education (ASEE) - Purdue Chapter

Collaborating with the Engineering Education Seminar Series to present relevant speakers. Sharing information of interest and encouraging participation in Research and Scholarship, including but not limited to relevant classes, research, and research presentation opportunities (such as ASEE conferences and the AGSERS Symposium).

Outreach chair **08/2018 - 05/2020**

Official Mechanical Engineering Graduate student Association (OMEGA)
Purdue University

Impact:Organized buddy program to mentor new graduate students by senior graduate students in academics, career plans and accustoming to Purdue. Introduced area exam group studies and guidance with senior PhD students

Professional experience

Associate Mechanical Engineer **09/2016 - 06/2017**

McDermott International, Inc., Chennai, India

Prepared the technical data sheets and purchase orders for the mechanical equipment on the offshore platforms. Played a significant role in designing the material handling procedure on the offshore oil platforms

Volunteer experience

Mathematics tutor 08/2018-10/2018

Oakland High School, Lafayette, Indiana

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V. Pulletikurthi