

Kiran Bhaganagar
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a. Professional Preparation

Cornell University Mechanical Engineering Doctor of Philosophy, 2001

b. Appointments

2001-2004 Postdoctoral Research, University of California, Los Angeles, CA
2004-2008 Assistant Professor, University of Maine, Orono, ME
2008-2009 Assistant Research Scientist, University of Michigan, Ann Arbor, MI
2009-2014 Assistant Professor, Department of Mechanical Engineering, University of Texas at San Antonio
2015-todate Associate Professor, Department of Mechanical Engineering, University of Texas, San Antonio, TX
2019-todate Core Faculty, NASA Center for Advanced Measurements in Extreme Events

c. Awards

- American Institute of Aeronautics and Astronautics (AIAA), Associate Fellow
- American Physics Society Women Physicist Award, April 2017
- Invited Visiting Professor, Laboratoire des Écoulements Géophysiques et Industriel, LEGI, Grenoble, France, May-Dec 2017

d. Research Activities

(i) **Book**

- Armistead Russell, Kiran Bhaganagar, Bart Croes, Joost De Gouw, Robert Yamartino, Qi Yang, *National Academies of Sciences, Engineering, and Medicine 2019*. Review of the Bureau of Ocean Energy Management "Air Quality Modeling in the Gulf of Mexico Region" Study. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25600>. Paperback ISBN: 978-0-309-49880-7
- *WRF-LES-bPlume* Kiran Bhaganagar, Sudheer BhimiReddy, Thanh. Tranh and Jesse Slaten – A Web-platform for simulation of turbulent plume subject to Atmosphere. <https://thanhrant219.wixsite.com/les-plume>.

(ii) **Editorials:** Editor, Physics of Fluids, Special Issue - A tribute to the lasting legacy of John Lumley in turbulence, February 2017.

(iii) Publications as Corresponding Author: * denotes Graduate student

1. Tyrell Lewis* and Kiran Bhaganagar, A Comprehensive Review of Plume Source Localization Efforts Using Unmanned Vehicle, *The Science of Total Environment*, in print, 2020.
2. Sudheer Bhimireddy* and Kiran Bhaganagar, A new LES-bPlume formulation within Weather Research and Forecast model: Role of atmospheric forcings on Buoyant Plume Release, *Monthly Weather Review*, in print, 2020.
3. Kiran Bhaganagar & Sudheer BhimiReddy*, [Local Atmospheric Factors that enhance Air-borne Dispersion of Coronavirus - High-fidelity Numerical Simulation of COVID19 case study in Real-Time](#), *Environmental Research*, 191, 2020.
4. Kiran Bhaganagar and Sudheer BhimiReddy*, [Numerical Investigation of starting turbulent buoyant plumes released in Neutral atmosphere](#). *Journal of Fluid Mechanics*, V900, A32, 2020.
5. Jordan Nielson*, Kiran Bhaganagar, Rajitha Meka*, A. Alaeddini, [Using atmospheric inputs for Artificial Neural Networks to improve wind turbine power prediction](#), *Energy*,190:117263, 2020
6. Jordan Nielson* and Kiran Bhaganagar, [Using field data-based large eddy simulation to understand role of atmospheric stability on energy production of wind turbines](#), 43(6):625-638, *Wind Engineering* (2019)
7. Kiran Bhaganagar and Sudheer BhimiReddy*, Scientific Reports: [The Role of Airborne Moments In The Spread Of The Coronavirus And The Course Of The Pandemic](#), Research Square, 2020.
8. Kamesh SubbaRao and Kiran Bhaganagar, [Nonlinear Model Predictive Control based Cooperative Plume Tracking using Unmanned Aerial Vehicles](#), *AIAA Science and Technology Forum and Exposition 2019*
9. Sudheer, R. Bhimireddy* & Kiran Bhaganagar, Performance [Assessment of Dynamic Downscaling of WRF to Simulate Convective Conditions during Sagebrush Phase I Tracer Experiments](#), *Atmosphere*, 2018
10. Jordan Nielson* & Kiran Bhaganagar, [Capturing Day to Day Diurnal Variations of Stability in the Convective Atmospheric Boundary Layer Using Large Eddy Simulation](#), *The open Atmospheric Science Journal* 2018
11. Sudheer R. Bhimireddy* & Kiran Bhaganagar, [Short-term passive tracer plume dispersion in convective boundary layer using a high-resolution WRF-ARW model](#), *Atmospheric Pollution Research*, 9:901-911, 2018
12. Kiran Bhaganagar & Narasimha Rao Pillalamarri,* [Lock-Exchange Release density currents over 3-D regular roughness elements](#), *Journal of Fluid Mechanics*, 2017
13. Manjura Nayamatullah*, Narasimha Rao Pillalamarri * & Kiran Bhaganagar, [Large-Eddy-Simulation Approach in Understanding flow structures of 2-D Turbulent Density Currents over sloping surfaces](#), *Fluid Dynamics Research*, 2017
14. Kiran Bhaganagar & Sudheer BhimiReddy*, [Assessment of the plume dispersion due to chemical attack on April 4, 2017, in Syria](#), *Natural Hazards*, 2017
15. Kiran Bhaganagar, [Role of head of turbulence 3-D density currents in mixing during slumping regime](#), *Physics of Fluids*, 020703, 2017

16. Kiran Bhaganagar, Tom Gatski and Will George, [Preface to special-topic: A tribute to John Lumley](#), *Physics of Fluids*, 020501, 2017
17. Kiran Bhaganagar et al, Editorial: [Tributes to the lasting legacy of John Leask Lumley in turbulence](#): A perfect man in an imperfect world, *Physics of Fluids*, 020601, 2017
18. Kiran Bhaganagar and Mithu Debnath*, [Effect of Mean Atmospheric Forcings of Stable Atmospheric Boundary Layer on Wind Turbine Wake](#), *Journal of Renewable and Sustainable Energy*. 2015.
19. Kiran Bhaganagar and Mithu Debnath*, [Implications of stably stratified atmospheric boundary layer turbulence on near-wake structure of wind turbine](#), *Energies*, 2014.
20. Kiran Bhaganagar and Long Chau*, [Characterizing turbulent flow over 3-D idealized and irregular rough surfaces at low Reynolds number](#), *Applied Mathematical Modeling*, 2014.
21. Kiran Bhaganagar, [Direct numerical simulation of lock-exchange density currents over rough wall in slumping phase](#), *Journal of Hydraulic Research*, 2014.
22. Kiran Bhaganagar and Carlos Moreno*, Modeling of Stenotic coronary artery and implications of plaque morphology on blood flow, *Modelling and Simulation in Engineering*, Volume 37, Issue 7, Pages 5381–5393, 2013
23. Kiran Bhaganagar, Chetan Veeramachaneni*, Carlos Moreno*, Significance of plaque morphology in modifying flow characteristics in a diseased coronary artery: Numerical simulation using plaque measurements from intravascular ultrasound imaging, *Applied Mathematical Modeling*, 37(7):5381-5393, 2013
24. Kiran Bhaganagar and Richard Leighton, Three level decomposition for the analysis of turbulent flow over rough-walls, *Journal of Applied Fluid Mechanics*, 6(2):257-265,2012
25. Long Chau* and Kiran Bhaganagar, Understanding turbulent flow over ripple-shaped random roughness in a channel, *Physics of Fluids* 24, 115102, 2012
26. Kiran Bhaganagar and Vejapong Juttijudata, Turbulent time-events in channel with rough walls, *Theoretical and Computational Fluid Dynamics*, December 2012, Volume 26, Issue 6, pp 583–589, 26(6): 583-589,
27. Richard Leighton and Kiran Bhaganagar Turbulence production by rough boundaries, 16th *USNCTAM* 2010:1173, June,2010.
28. K. Bhaganagar, R. Beaumont*, B. Segee and B. Ozer, Using fuzzy logic for Morphological Classification of IVUS-based plaques in Coronary artery in the context of hydrodynamics, *Soft Computing*, 14: 265, 2010.
29. K. Bhaganagar Direct numerical simulation of flow in stenotic channel to understand the effect of stenotic morphology on turbulence, *Journal of Turbulence*, N41, Volume 10, 2009
30. K. Bhaganagar and T. Hsu, Direct Numerical simulations of flow over two-dimensional and three-dimensional ripples and implication to sediment transport: Steady flow, *Coastal Engineering*, Volume 56, Issue 3, March 2009, Pages 320–331
31. K. Bhaganagar, Direct numerical simulation of unsteady flow in channel with rough walls, *Physics of Fluids* 20, 101508 (2008)
32. M. Sen*, K. Bhaganagar and V. Juttijudata, Application of proper orthogonal decomposition (POD) to investigate a turbulent boundary layer in a channel with rough walls, *Journal of Turbulence*, Article: N41: Vol 8, 2007

33. K. Bhaganagar, J. Kim and G. Coleman, "Effect of roughness on pressure fluctuations in a turbulent boundary layer", *Physics of Fluids*, 028103, 2007
34. K. Bhaganagar, J. Kim and G. Coleman, Effect of Roughness on wall bounded turbulence, *Flow, Turbulence and Combustion*, July 2004, Volume 72, Issue 2, pp 463–492,2004
35. K. Bhaganagar, D. Rempfer and J.L. Lumley, Direct Numerical Simulation of Spatial Transition to Turbulence using Fourth-Order Vertical Velocity Second-Order Vertical Vorticity Formulation, *Journal of Computational Fluid Dynamics*, Volume 180, Issue 1, 20 July 2002, Pages 200-228, 2002

iv-B. Covid19 Related Delays: Manuscripts (Conditionally Accepted)

1. Rajitha Meka*, Adel Alaeddini and Kiran Bhaganagar, A robust deep learning framework for short-term wind power forecast of a full-scale wind farm, *Energy*, 2020. (Decision Major Revision (04/2020). Revision Submitted (06/2020). Awaiting editor decision).
2. Jesse Slaten* and Kiran Bhaganagar, Turbulent entrainment in buoyant turbulent plume, *Journal of Applied Meteorology*,2020 (Decision Minor Revision (06/2020). Revision Submitted (06/2020). Awaiting editor decision).

(V) Scholarly Presentations (Recent)

A. Invited Talks

1. TACC Symposium, UT Austin, Invited Talk, Turbulent Buoyant Plumes in the Atmosphere, September 17th, 2020.
2. (cancelled due to Covid19) European Geophysical Union, Vienna, Austria, Entrainment scaling in heated buoyant plume, April, 2020
3. PI meeting, U.S. Coast Guard, Connecticut, Data Analytical approach for leeway detection, February 2020.
4. Grand Vision for Wind Energy, NAWEA WindTech Amherst, MA, 2019, Machine Learning Approach towards short term forecasting of wind turbine power production.
5. University di Roma tre, Rome, Italy, November 2017, Entrainment and mixing in ocean and role of lock-exchange release turbulent flows.
6. University of Lorraine, Nancy, France, October 2017, Framework of density currents over roughness
7. Barcelona Supercomputing Center, Barcelona, Spain, October 2017, Understanding turbulence mixing in oceanic and atmospheric flows from Simulations to UAV's
8. Laboratoire des Écoulements Géophysiques (LEGI), Grenoble. France, October 2017, Understanding role of roughness effects on turbulence mixing in Turbulence buoyancy driven flows
9. European Turbulence Conference (ETC16), Stockholm, Sweden, August 2017, Density currents over rough-walls: Relation between drag and mixing.
10. European Geophysical Unit, Vienna, April 2017, Few thoughts on Mixing and Entrainment of Lock-Release Turbulent Dense Currents over Rough-Surfaces

11. 11th International ERCOFTAC Symposium on Engineering Turbulence Modeling and Measurements, Palermo, Sicily, Italy, September 2016, Framework for Buoyancy-Driven Flows using Large Eddy Simulations.
12. EGU, Vienna, April 2016, Numerical investigation of entrainment of dense currents
13. Whither turbulence and big data, Cargese Institute, Corsica, April 2015, Effect of roughness on turbulence from lab-scales to atmospheric scales.
14. Work Shop on Challenges in Wind Energy: Future directions & Role of Wake Effects, August 9th, Pollachi, Coimbatore, India, 2015
15. Towards improved prediction of wakes of wind turbines, International Conference on Renewable Energy and Sustainable Environment, August 10-13, Pollachi, Coimbatore, India, 2015
16. K. Bhaganagar, Turbulence interactions in the wake: New perspective, SIAM Conference on Computational Science & Engineering, 2015, Salt Lake City, Utah. (Organizer of minisymposium and Invited talk)
17. Towards improved prediction of wake-wake interactions of wind turbine, Iowa State University, Ames, Iowa, 04/22/2014
18. Understanding density currents over rough-topography, Symposium on Fluid Dynamics, San Juan Puerto Rico, November 2013.
19. K. Bhaganagar, Towards building wind energy program in state of Texas, April 2012, Dallas, Organized by Texas Tech University (UTSA representative)
20. K. Bhaganagar, Buoyancy driven flows and application to environmental flows, Collaborative Initiative for Wind Turbine Research, Lubbock, Texas, March 2012

(B.) Conference Presentations (Abstract Submissions)

1. Meka, R. K. Bhaganagar & A. Alaeddini. (2020). A Deep Learning Framework for Forecasting Power in a Full-Scale Wind Farm, 100th, American Meteorological Society Annual Meeting, Boston, MA, January 16th-19th, 2020.
2. S. BhimiReddy, K. Bhaganagar (2020). New Implementation of Buoyant Transport and Dispersion in Weather Research & Forecast's Large-Eddy Simulation Framework, 100th, American Meteorological Society Annual Meeting, Boston, MA, January 16th-19th, 2020.
3. D. Brun, S. BhimiReddy and K. Bhaganagar, Plume Chamber studies to characterize Turbulent Buoyant Plumes using multiple sensors, Bulletin of the American Physical Society, APS-DFD, Seattle, 2019
4. S. BhimiReddy and K. Bhaganagar, Bulletin of the American Physical Society, APS-DFD, Seattle, 2019

5. Nielson, J. & Bhaganagar, K. (2018). Using Artificial Neural Networks and the Rapid Refresh Model for Wind Energy Forecasting, 71st Annual Meeting of the APS Division of Fluid Dynamics, November 18–20, 2018; Atlanta, Georgia
6. Brun, D. Bhimireddy, S. & Bhaganagar, K. (2018). Flow Calculations of Forced Buoyant Plume using Infrared Gas-Visualization, 71st Annual Meeting of the APS Division of Fluid Dynamics, November 18–20, 2018; Atlanta, Georgia
7. Bhimireddy, S., Brun, D. & Bhaganagar, K. (2018). Investigation of mean scalar characteristics of vertical buoyant gas plume inside a gas chamber with multiple sensors, 71st Annual Meeting of the APS Division of Fluid Dynamics, November 18–20, 2018; Atlanta, Georgia
8. Bhaganagar, K., & Reddy, S. (2016). Simulation of plume rise: Study the effect of stably stratified turbulence layer on the rise of a buoyant plume from a continuous source by observing the plume centroid (20th ed., vol. 61). 69th Annual Meeting of the APS division of Fluid Dynamics, Portland, Oregon, November 2016.
9. Bhaganagar, K., & Nielson, J. (2016). Using Reconstructed POD Modes as Turbulent Inflow for LES Wind Turbine Simulations (20th ed., vol. 61). 69th Annual Meeting of the APS division of Fluid Dynamics, Portland, Oregon, November 2016.
10. J. Nielson and K. Bhaganagar, Towards LES Modeling of the Diurnal Cycle from Field Data Inputs, WindFarms-2016,,Dallas, April, 2016
11. J. Nielson and K. Bhaganagar,, Using LES to Understand Wake Evolution During Diurnal Cycle, 9-15-1 15th International Symposium on Measurement and Modeling of Environmental Flows, International Mechanical Engineering Congress and Exposition, November 13-19, 2015, Houston, Texas.
12. K. Bhaganagar, M. Naymatullah, C. Cenedese, AGU Annual Meeting, San Francisco, 2014.
13. K. Bhaganagar and F. Hussain, Vortex structures in wind turbine wake due to atmospheric stratification, 67th APS-DFD, San Francisco, 2014.
14. K. Bhaganagar, Jordan Nielson and Mithu Debnath, Turbulence in wind turbine wake: Effect of atmospheric forcings, ASME Congress of Mechanical Engineering and exposition, Montreal, 2014.
15. K. Bhaganagar, J. Nielson* and M. Debnath*, Turbulence in wind turbine wake, Effect of atmospheric forcings, , November 14-20, Fluid Dynamics meeting, Canyon Lake Texas, 2013
16. K. Bhaganagar, Stratification effects on wake of large wind turbines in wind Farm, APS-DFD Annual meeting, Pittsburgh, Nov 24-26, 2013.
17. K. Bhaganagar, Classification of dense currents over rough wall, APS-DFD Annual meeting, Pittsburgh, Nov 24-26, 2013.
18. K. Bhaganagar and R. Chowdhury, Buoyancy driven turbulent flows over irregular rough surfaces, 65th Annual Meeting of the APS Division of Fluid Dynamics November 18-20, 2012; San Diego, California
19. C. Moreno and K. Bhaganagar, Patient specific flow dynamic simulations of flow in diseased coronary artery, 65th Annual Meeting of the APS Division of Fluid Dynamics November 18-20, 2012; San Diego, California
20. G. Sloan, Z. Feng, K. Bhaganagar and D. Benerjee, Numerical simulation of nanoparticle simulation with experimental validation, 65th Annual Meeting of the APS Division of Fluid Dynamics November 18-20, 2012; San Diego, California

21. K. Bhaganagar, Buoyancy driven flows and application to environmental flows, Collaborative Initiative for Wind Turbine Research, Lubbock, Texas, March 2012
22. K. Bhaganagar, Direct numerical simulations of density currents over rough surfaces, APS-DFD, Baltimore, MD, 2011
23. L. Chau and K. Bhaganagar, Direct numerical simulations of flow over ridges in the presence of waves and current, 63rd APS-DFD, Long Beach, CA, 2010
24. K. Bhaganagar, R. Leighton, An Analytical framework for the study of rough-wall turbulent boundary layer, 63rd APS-DFD, Long Beach, CA, 2010
25. R. Leighton and K. Bhaganagar, Turbulence production by rough boundaries, 2010, State College, PA, June, 2010
26. K. Bhaganagar, V. Juttijudata, M. Sen, Further insight into physics of rough-wall turbulent boundary layer” 61st APS-DFD, Washington, D.C., 2008

VI. Intellectual Property and Patents

Kiran Bhaganagar, Prasanna Kolar, Sudheer Bhimireddy and Jordan Nielson, *Mobile- RTEC: Low cost mobile environmental sensing system with remote access in real-time*, Patent Filed October 2018.

Kiran Bhaganagar, Sudheer Bhimireddy, Prasanna Kolar, Victor Canseso, Danial Brun, *Experimental facility for generation, measurement and visual detection of vertical momentum and buoyancy driven plumes*. Patent Filed November 2018