

Anupam Sharma

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Research Interests

- Bio-inspired designs for aerodynamic noise reduction
- Dynamic stall modeling and mitigation
- Wind farm aerodynamics and aeroacoustics
- Wind-wildlife interaction
- Numerical algorithms

Education

2001–2004 **Ph.D.**, *Pennsylvania State University*, University Park, PA, USA

Title *Numerical simulations of blast-impact problems using the direct simulation monte carlo method*

Adviser Prof. Lyle N. Long

Ph.D. minor in High Performance Computing

1999–2001 **M.S.**, *Pennsylvania State University*, University Park, PA, USA

Title *Parallel methods for unsteady, separated flows and aerodynamic noise prediction*

Adviser Prof. Lyle N. Long

M.S. minor in High Performance Computing

1995–1999 **B.Tech.**, *Indian Institute of Technology Bombay*, Mumbai, India

Title *Passage through resonance of rolling, finned projectiles with center-of-mass offset*

Adviser Prof. N. Ananthkrishnan

Research Experience

2024–present **Professor**, *Iowa State University*, Ames, IA

- Research in computational aeroacoustics and aerodynamics including dynamic stall
- Ultrasonic deterrents to mitigate bat mortality at wind turbines
- Teach aerospace propulsion, turbomachinery, compressible flow, aeroacoustics, and computational fluid mechanics

2018–2024 **Associate Professor**, *Iowa State University*, Ames, IA

- Research in aeroacoustics (prediction and mitigation), wind turbine aerodynamics and aeroacoustics
- Dynamic stall characterization, modeling, and mitigation
- Developing ultrasonic deterrents to mitigate bat mortality at wind turbines
- Teach courses in propulsion, turbomachinery flow, compressible flow, aeroacoustics, computational fluid mechanics, and wind turbine aerodynamics

2019–2022 **Associate Chair of Aerospace Engr.**, *Iowa State University*, Ames, IA

- Plan the undergraduate and graduate curricula and course offerings for the department
- All undergraduate academic affairs

- Jun–Jul '21 **Summer Faculty Fellow**, *Air Force Research Laboratory*, WPAFB, OH
 and '20
 - Characterization of stall onset using dynamical systems theory
 - Dynamic stall modeling using detached eddy simulations (DES)
- 2012–2018 **Assistant Professor**, *Iowa State University*, Ames, IA
 - Research in wind turbine aerodynamics & aeroacoustics, and turbomachinery noise
 - Teach courses in propulsion, turbomachinery flow, compressible flow, aeroacoustics, and wind turbine aerodynamics
- May–Jun '16 **Summer Faculty Fellow**, *Air Force Research Laboratory*, WPAFB, OH
 - Dynamic stall modeling using large eddy simulations
 - Effect of airfoil thickness on the onset of dynamic stall
- 2009–2012 **Senior Engineer**, *General Electric Global Research*, Niskayuna, NY
 - Assessed aerodynamic losses in the root region of a Horizontal Axis Wind Turbine
 - Lead the Wind Turbine Aeroacoustics and Aerodynamics team of 6 PhDs with a focus on the development of prediction tools
 - Developed reduced order models for fan broadband noise prediction
- Oct–Nov '10 **Visiting Scholar**, *University of Cambridge*, Cambridge, UK
 - Developed numerical methods for long-range propagation of noise from wind farms
- 2004–2009 **Lead Engineer**, *General Electric Global Research*, Niskayuna, NY
 - Developed and validated a novel open rotor tone noise prediction system
 - Developed a 3-D noise prediction system for fan-OGV interaction tone noise
 - Designed an entirely numerical procedure to predict Multiple Pure Tones (MPT) generation and propagation in hard-wall and lined ducts
- May–Aug'03 **Summer Intern**, *General Electric Global Research*, Niskayuna, NY
 - Developed a novel numerical algorithm and a tool to predict aerodynamic noise from wind turbines
 - Analyzed turbine designs for noise signature, and evaluated the effect of flow control on noise reduction
- 1999–2004 **Research Assistant**, *Pennsylvania State University*, University Park, PA
 - Developed a particle method-based CFD solver to study the interaction of blast waves with structures
 - Innovated a new algorithm to numerically model moving solid boundaries
 - Developed an aeroacoustic integral solver to predict aerodynamic noise from the landing gear of an aircraft
 - Predicted and analyzed airwake from the LPD17 ship for a spectrum of wind conditions
- May–Aug'99 **Summer Intern**, *National Aeronautics Laboratory*, Bangalore, India
 - Reviewed and reported advancements in fluid physics in micro-gravity to the Indian Space Research Organization (ISRO)

Teaching Experience

Aug'19–Aug'22 **Associate Chair of the Undergraduate Program**, *Aerospace Engineering*, ISU

Graduate Courses

AerE-547	Computational Fluid Dynamics and Heat Transfer-II	<i>Sp 2023, '22, '20</i>
AerE-583	Aeroacoustics	<i>F 2020, '16, '14</i>
WESEP-501	Wind Energy Resources (8 lectures)	<i>F 2016, '15, '13, '12</i>

Undergraduate Courses

AerE-448	Fluid Dynamics of Turbomachinery	<i>Sp 2023, '21, '18, '14, '13, '12</i>
AerE-411	Propulsion of Aerospace Vehicles-I	<i>F 2023, '22, Sp '16, F '17, '16, '15, '14, '13</i>
AerE-311	Aerodynamics II: Compressible Flow	<i>F 2022, '21, '18, '17</i>
EM-451	Engineering Acoustics	<i>F 2012</i>

Student Evaluations (rating out of 5)

Semester	Course No.	Enrolled	Responses	Instructor Rating (out of 5)
Fall 2023	AERE-411	96	34	3.53
Spring 2023	AERE-547	11	6	5.00
Spring 2023	AERE-448	37	10	4.50
Fall 2022	AERE-311	80	37	3.78
Fall 2022	AERE-411	49	20	4.20
Spring 2022	AERE-547	8	5	4.60
Fall 2021	AERE-311	57	25	4.08
Spring 2021	AERE-448	30	12	4.67
Fall 2020	AERE-583	5	4	4.50
Fall 2020	AERE-483	18	9	4.33
Spring 2019	AERE-547	5	2	4.50
Fall 2018	AERE-311	33	20	4.00
Spring 2018	AERE-448	43	16	4.63
Fall 2017	AERE-311	71	36	4.53
Fall 2017	AERE-411	48	31	4.16
Fall 2016	AERE-583X	11	19	4.50
Fall 2016	AERE-411	55	29	4.62
Spring 2016	AERE-411	43	16	3.75
Fall 2015	AERE-411	49	25	4.32
Fall 2014	AERE-583X	13	6	4.50
Fall 2014	AERE-411	52	18	4.22
Spring 2014	AERE-448	27	16	4.13
Fall 2013	AERE-411	29	19	3.74
Spring 2013	AERE-448	25	15	4.27
Fall 2012	EM-451	8	7	4.57
Spring 2012	AERE-448	28	20	3.60

Invited Seminars / Talks

- A webinar titled “Aerodynamic whistle-based ultrasonic bat deterrents,” a webinar hosted by the Renewable Energy Wildlife Institute (REWI), Jan 2023
- A webinar titled “Passive, blade-mounted ultrasonic bat deterrents,” hosted by American Wind and Wildlife Institute (AWWI), Nov 2021
- Research talk titled “Numerical investigations of quiet blade designs inspired by the unique feather features of the night owl” at US Naval Research Laboratory, Washington DC, Apr 2018
- Invited seminar titled “Numerical investigations of quiet blade designs inspired by the unique feather features of the night owl” at (1) Indian Institute of Science, Bangalore, India, (2) Indian Institute of Technology Bombay, Mumbai, India, and (3) General Electric Aviation, Bangalore, India. Institute Rensselaer, NY, Feb 2017, Mar 2017
- Invited seminar titled “Analysis and design of a novel conceptual turbine to enhance wind farm efficiency,” in the Mechanical, Aerospace and Nuclear Engineering Department at Rensselaer Polytechnic Institute, Rensselaer, NY, Feb 2017
- Research seminar titled “Effect of airfoil thickness on incipience of dynamic stall at $Re_c=200,000$,” at the Air Force Research Laboratory, Wright Patterson Air Force Base, Ohio, Aug 2016
- Invited seminar titled “Innovative solutions to enhance wind turbine/farm performance and reduce noise,” at the University of Kansas, Lawrence, April 2016
- Invited seminar titled “Wind turbine and wind farm aerodynamics and aeroacoustics,” at the University of Illinois at Urbana Champaign, Illinois, Nov 2014
- Invited webinar titled “Gas turbine cycle analysis with a focus on propulsion” at the General Electric Global Research Center, Niskayuna, NY, June 2014

- Invited seminar titled “Windfarm aerodynamics and aeroacoustics,” at the Argonne National Laboratory, Illinois, Sep 2013
- Seminar titled “Aerodynamic tone noise from open rotors” at NASA Langley Research Center, Oct 2012, at IIT Delhi, Nov 2012, and at ISU, Jan 2013
- Invited seminar titled “An overview of GE’s research in aeroacoustics,” at the University of Cambridge, Oct 2010
- Seminar on blast-impact simulations using direct simulation monte carlo, and turbomachinery aeroacoustics at the Indian Institute of Technology (IIT), Madras, and at IIT Delhi, India, Oct 2006
- Seminar and discussion on rotor-stator interaction tone noise prediction, NASA Glenn, July 2006
- Invited talk on parallel algorithms for particle methods, SIAM Conference for Parallel Computing, Feb 2004
- Instructor for a graduate level course titled “Introduction to many-body problems and algorithms” at PSU, Spring 2004. (10 lectures)
- Lectures on object oriented programming in a graduate level course at PSU, Fall 2003. (3 lectures)

Current Students

Ph.D.

- Jan’21– **Abhishek Barman**, *Space-time framework for computational fluid dynamics simulations*
 Jan’23– **Hannah Blumhoefer**, *Scientific machine learning (SciML)-enabled CFD*
 Jan’23– **Sudeep Menon**, *TBD*
 Aug’23– **Dylan Sitarski**, *TBD*

M.S.

- Aug’23– **Andrew Fung**, *TBD*

Alumni

Postdocs

- 2018–2019 **Dr. Behnam Moghadassian**, *Optimal acoustic metamaterials for soundproofing*, with Dr. Atul Kelkar
- 2017–2024 **Dr. Sarasija Sudharsan**, *Investigation of the role of vorticity dynamics in the incipience of dynamic stall*
- 2018–2024 **Dr. Zhangming Zeng**, *Design of an ultrasound whistle for mitigation of bat fatalities at wind turbines*
- 2017–2022 **Dr. Jiangli Yin**, *Development of pressure-based algorithms for time-accurate moving body simulations*
- 2017–2020 **Dr. Xingeng Wu**, *Numerical investigation of flow over elastically-mounted circular cylinders*
- 2016–2019 **Dr. Mohammad Jafari**, *Aerodynamic-load identification and prediction of wind-induced vibration of structural/power-line cables and traffic signal structures*
- 2016–2019 **Dr. Andrew Bodling**, *Numerical investigations of nearly silent blade designs inspired by the downy coat of the night owl*
- 2014–2017 **Dr. Behnam Moghadassian**, *Aerodynamic performance analysis and inverse design of horizontal axis wind turbines*
- 2013–2016 **Dr. Aaron Rosenberg**, *A computational analysis of wind turbine and wind farm aerodynamics with a focus on dual rotor wind turbines*

M.S.

- 2017–2022 **Ang Li**, *A computationally efficient, hybrid CFD-panel method approach for modeling unsteady aerodynamics of maneuvering airfoils*
- 2016–2017 **Vishal Vijay**, *Techniques to identify physical sources of aerodynamically generated sound*
- 2016–2017 **Andrew Bodling**, *Numerical investigations of the owl hush-kit using large eddy simulations and acoustic analogies*
- 2015–2017 **Xingeng Wu**, *Detached Eddy simulations of stationary and vibrating cables in turbulent winds*
- 2012–May’15 **Bharat Agrawal**, *Aerodynamic noise prediction for a rod-airfoil configuration using incompressible and compressible large eddy simulations*
- 2012–May’14 **Suganthi Selvaraj**, *Numerical investigations of wind turbine and wind farm aerodynamics*

B.S.

- Jun’22–
Aug’23 **Dylan Sitarski**, *Aeromechanical analysis of a spectroscopic probe under dynamic loading*
- Jun–Dec’22 **Hannah Blumhoefer**, *Scientific machine learning (SciML)-enabled CFD*
- Sep–Dec’21 **Darrell Damiba**, *Experimental evaluation of a passive ultrasonic bat deterrent*
- Sep–Dec’21 **Hannah Blumhoefer**, *Review of the Virginia Tech anechoic wind tunnel and develop guidance for the Bill James wind tunnel*
- Sep’19–
Dec’20 **Austin Freund**, *Design of a passive ultrasonic bat deterrent*
- Sep’18–
May’20 **Bruce Ciccotosto**, *Aeroacoustic analysis of air amplifiers*
- Sep’17–
Dec’19 **Nicholas Wijaya**, *Potential methods for wind turbine blade design*
- Sep’14–
May’17 **Rachel Pick**, *Experimental aeroacoustics investigations of the leading edge comb of owl wings*
- Sep–Dec’16 **Myra James**, *Experimental investigations of an aeroacoustic whistle*
- Sep–Dec’14 **Rolls Royce Project**, *Analysis of aircraft auxiliary systems, (six AerE seniors)*
- Aug–Dec’13 **John Watson**, *CFD analyses of a turbomachine stage using STAR CCM+ software*
- May–Jul’13 **Angelo J. Chaves**, *Development of an actuator disk model in OpenFOAM to investigate windfarm aerodynamics*
- Jan–May’13 **Edward (Ted) Angus**, *On identifying similarities between cut-off ratio, sonic radius, and radiation efficiency in acoustic radiation from rotating machinery, (ME senior)*
- May–Jul’12 **Devin Cummins**, *Refurbishing the anechoic chamber at ISU and conducting benchmarking tests, developing acoustic demonstrations for educational and outreach activities, (AerE senior)*
- May–Jul’12 **Samuel Frishman**, *Development of a model to explain “swishing” noise from horizontal axis wind turbines, (JHU, freshman)*
- Jan–May’12 **Senior design project**, *Designing, developing, and testing a vertical axis wind turbine for household use, (co-advised with Prof. Hui Hu), (8 AerE seniors)*

Grants

Financial (Federal)

- 2024–’28 **DOE EERE**, *Advancing aerodynamic whistle based ultrasonic bat deterrence technology to enable ultra-large wind turbines, \$750K, (with Dr. William N. Alexander)*

- 2023–’27 **NSF Mid-scale Research Infrastructure - 1**, *National testing facility for enhancing wind resiliency of infrastructure in tornado-downburst-gust front events*, \$14M, (with Drs. Partha Sarkar, A. Alipour, G. Yan, and D. Zuo)
- 2022–’25 **AFOSR - Unsteady Aerodynamics and Turbulent Flows**, *Data-enhanced hybrid modeling for turbulent aerodynamics*, \$553K, (with Dr. Paul Durbin)
- 2022–’24 **Defense Threat Reduction Agency (DTRA) via OneLight Sensing**, *MONITOR - Broadband laser diagnostic probe for detonation environments*, \$315K, (with Drs. James Michael & Travis Sippel)
- 2020–’23 **National Science Foundation**, *MRI: Acquisition of a shared high-performance computing system for cyber-enabled system design*, \$600K, (with Drs. Somani, Ryan, Lawrence-Dill, & Ganapathysubramanian)
- 2019–’23 **National Science Foundation**, *Characterization of onset of dynamic stall for low mach number flows*, \$373K, (with Dr. Baskar Ganapathysubramanian)
- 2019–’22 **Department of Energy**, *Passive ultrasonic deterrents to reduce bat mortality in wind farms*, \$200K
- 2016–’22 **National Science Foundation**, *CAREER: Ultra quiet aircraft propulsion inspired by the unique plumage of the owl*, \$500K
- 2015–’19 **National Science Foundation**, *Predicting dynamic response of structural cables and power transmission lines in hurricanes and other windstorms*, \$338K, (with Dr. Partha Sarkar)
- 2014–’18 **National Science Foundation**, *Innovative dual-rotor wind turbine (drwt) designs for improved turbine performance and wind farm efficiency*, \$330K, (with Dr. Hui Hu)
- [Financial \(State\)](#)
- Jan-Sep 2017 **Iowa Energy Center**, *Organizing the 2017 North American Wind Energy Academy symposium at ISU*, \$15K, (with Dr. Hui Hu)
- 2014–’17 **Iowa Space Grants Consortium**, *CAREER: Biomimetic designs to silence next-gen aircraft propulsion systems*, \$105K
- Feb-Sep’15 **Iowa Energy Center**, *Innovative dual-rotor wind turbine designs for improved wind farm performance*, \$115K, (with Dr. Hui Hu)
- Jan-Jul’13 **Iowa-NASA EPSCoR**, *Open rotor installation & fan broadband noise research*, \$15K
- Jan-Dec’12 **Iowa-NASA EPSCoR**, *Developing a research community in the area of aeroacoustics at iowa state university*, \$15K
- [Financial \(Industry\)](#)
- 2022 **Enel Group**, *Experimental testing of a novel passive ultrasonic bat deterrent for wind turbines*, \$30K USD
- 2018–’19 **LAM Research**, *Computational investigation of aerodynamic noise in air amplifiers*, \$25K USD
- Mar-Dec’14 **GE Global Research Center**, *Modeling aerodynamic loads in actuated wind turbines*, \$50K
- Jul-Dec’13 **GE Global Research Center**, *Modeling transient aerodynamic loads in wind turbines*, \$50K
- Jul-Dec’12 **GE Global Research Center**, *Direct computation of fan broadband noise using LES*, \$30K
- [Financial \(ISU Internal; competition/proposal based\)](#)
- Jan-Aug’21 **ISU ERP**, *Enabling LES-based turbomachinery design via an adaptive space-time framework*, 16.6K, with Dr. Ganapathysubramanian
- Aug-Dec’21 **ISU ERP**, *Leveraging large-scale mixing ability of wind turbines to tackle urban air pollution*, 16.6K, with Dr. Sarkar
- [Computational \(Federal\)](#)

- 2018–'19 **Department of Energy ASCR ALCC Award**, *Analysis and mitigation of dynamic stall in energy machines*, 51.5M CPU hrs \approx \$2.4M USD
- 2017–'18 **National Science Foundation**, *Unraveling silent owl flight to develop ultra-quiet aircraft and wind turbines (contd.)*, 2M CPU hrs \approx \$70K
- 2017–'18 **Department of Energy INCITE Award**, *LES to characterize shock boundary layer interaction in a 3D transonic turbofan*, 90M CPU hrs \approx \$4.5M, with Dr. Umesh Paliath of GE
- 2016–'17 **Department of Energy ASCR ALCC Award**, *Unraveling silent owl flight to develop ultra-quiet energy conversion machines*, 25M CPU hrs \approx \$1.2M USD
- 2015–'16 **National Science Foundation**, *Unraveling silent owl flight to develop ultra-quiet aircraft and wind turbines*, 1M CPU hrs \approx \$48K
- Jan–Dec'13 **NSF XSEDE**, *Towards developing a wind-farm aerodynamic and aeroacoustic optimization (waaao) framework*, 800K CPU hrs
- Jan–Dec'13 **DoE INCITE**, *Enabling green energy and propulsion systems via direct noise computation*, 105M CPU hrs, (GE GRC as lead PI)

Awards & Honors

- 2019 **Early Achievement in Teaching**, College of Engineering, Iowa State University
- 2023, '21, & '19 **US Air Force Summer Faculty Fellowship**, *Characterization of onset of dynamic stall*, Wright Patterson Air Force Base
- 2018 **Associate Fellow of AIAA**, American Institute of Aeronautics and Astronautics
- 2016 **NSF Early CAREER Award**, *Ultra quiet aircraft propulsion inspired by the unique plumage of the owl*, NSF/CBET
- 2016 **US Air Force Summer Faculty Fellowship**, *Numerical investigation of geometry and reynolds number effects in airfoil dynamic stall*, Wright Patterson Air Force Base
- 2014 **Renewable Energy Impact Award**, *Innovative dual-rotor wind turbine designs for improved turbine performance and wind-farm efficiency*, Iowa Energy Center, (with Dr. Hui Hu)
- 2011 **Technology Project of the Year Award**, *Open rotor noise reduction*, GE Global Research: Aero, Thermal, & Mechanical Systems
- 2009 **Best Publication Award**, *Numerical prediction of exhaust fan-tone noise from high-bypass aircraft engines*, GE Global Research: Energy & Propulsion Technologies
- 2000 **Outstanding Research Award**, *Rotorcraft Dynamics*, Vertical Flight Foundation
- 1999 **Institute Silver Medal**, *Graduated cum-laude in Aerospace Engineering*, Indian Institute of Technology Bombay

Professional Memberships

- 2018–current Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA)
- 2017 Chair and organizer of the 2017 North American Wind Energy Academy (NAWEA) Symposium
- 2017–current Member of the Editorial Board of the International Journal of Aeroacoustics
- 2017–current Member of the AIAA Aeroacoustics Technical committee
- 2021 & 2015 Executive committee member of the NAWEA & WindTech Symposia
- 2009–2017 Senior member of American Institute of Aeronautics and Astronautics (AIAA)
- 2012–2022 Faculty adviser for the AIAA student chapter at ISU
- 2012–current Member of American Society of Mechanical Engineers (ASME)
- 2008–2011 Member of the AIAA Aeroacoustics Technical committee

Current Reviewer for Journal of Fluid Mechanics, Journal of Sound and Vibration, AIAA Journal, Journal of Acoustical Society of America, Wind Energy, Energies, PLOS One, Bioinspiration & Biomimetics, and Journal of Turbomachinery

Journal Publications

- J34 Biswajit Khara, Robert Dyja, Kumar Saurabh, A. Sharma, and Baskar Ganapathysubramanian, "Solving fluid flow problems in space-time with multiscale stabilization: formulation and examples", *Computer Methods in Applied Mechanics and Engineering*, Under review.
- J33 Z. Zeng and A. Sharma, "A passive, blade-mounted ultrasonic bat deterrent for wind turbines", *Applied Acoustics*, Under review.
- J32 S. Sudharsan and A. Sharma, "Criteria for dynamic stall onset and vortex shedding in low Reynolds number flows", *Journal of Fluid Mechanics*, Under revision.
- J31 Z. Zeng and A. Sharma, "Novel ultrasonic bat deterrents based on aerodynamic whistles", *Physics of Fluids*, Vol. 35, Issue 9, 2023 (doi.org/10.1063/5.0160564)
- J30 S. Sudharsan, S. Narsipur and A. Sharma, "Evaluating dynamic stall onset criteria for mixed and trailing-edge stall", *AIAA Journal*, Vol. 61, No. 3, 2023 (doi.org/10.2514/1.J062011)
- J29 J. Yin, G. Rajagopalan and A. Sharma, "An Unstructured, Pressure-Based Algorithm using Implicit Runge-Kutta for Moving Boundary Problems", *AIAA Journal*, Vol. 60, No. 10, 2022 (doi.org/10.2514/1.J061929)
- J28 S. Sudharsan, B. Ganapathysubramanian and A. Sharma, "A vorticity-based criterion to characterise leading-edge dynamic stall onset", *Journal of Fluid Mechanics*, Vol. 935, 2022 (doi.org/10.1017/jfm.2021.1149)
- J27 X. Wu and A. Sharma, "Artefacts of Finite-Span Domain in Vortex-Induced Vibration Simulations", *Applied Ocean Engineering*, Vol. 101, 2020 (doi.org/10.1016/j.apor.2020.102265)
- J26 M. Sadoughi, C. Hu, B. Moghadassian, A. Sharma, J. Beck, and D. Mathiesen "Sequential Online Dispatch in Design of Experiments for Single- and Multi-Response Surrogate Modeling", *IEEE Transactions on Automation Science and Engineering*, 2020 (doi.org/10.1109/TASE.2020.2969884)
- J25 X. Wu, M. Jafari, P. Sarkar, and A. Sharma, "Verification of DES for Flow over Rigidly and Elastically-Mounted Circular Cylinders in Normal and Yawed Flow", *Journal of Fluids & Structures*, Vol. 94, 2020 (doi.org/10.1016/j.jfluidstructs.2020.102895)
- J24 B. Moghadassian and A. Sharma, "Designing Wind Turbine Rotor Blades to Enhance Energy Capture in Turbine Arrays," *Renewable Energy*, Vol. 148, 2020, pp. 651-664 ([doi:10.1016/j.renene.2019.10.153](https://doi.org/10.1016/j.renene.2019.10.153))
- J23 A. Sharma and M. Visbal, "Numerical Investigation of the Effect of Airfoil Thickness on Onset of Dynamic Stall," *Journal of Fluid Mechanics*, Vol. 870, 2019 ([doi:10.1017/jfm.2019.235](https://doi.org/10.1017/jfm.2019.235))
- J22 A. Bodling and A. Sharma, "Numerical Investigation of Noise Reduction Mechanisms in a Bio-inspired Airfoil," *Journal of Sound & Vibration*, Vol. 453, 2019 ([doi:10.1016/j.jsv.2019.02.004](https://doi.org/10.1016/j.jsv.2019.02.004))
- J21 A. Bodling and A. Sharma, "Numerical Investigation of Low-Noise Airfoils Inspired by the Down Coat of Owls," *Bioinspiration & Biomimetics*, Vol. 14, No. 1, 2018 ([doi: 10.1088/1748-3190/aaf19c](https://doi.org/10.1088/1748-3190/aaf19c))
- J20 A. Thelen, L. Leiffson, A. Sharma, and S. Koziel, "Variable-fidelity Shape Optimization of Dual-Rotor Wind Turbines" *Engineering Computations*, Vol. 35, No. 316, 2018 ([doi: 10.1108/EC-12-2017-0502](https://doi.org/10.1108/EC-12-2017-0502))
- J19 B. Moghadassian and A. Sharma, "Inverse Design of Single- and Multi-Rotor Horizontal Axis Wind Turbine Blades using Computational Fluid Dynamics", *Journal of Solar Energy Engineering: Including Wind Energy and Building Energy Conservation*, Vol. 140, No. 2, 2018 ([doi:10.1115/1.4038811](https://doi.org/10.1115/1.4038811))
- J18 A. Thelen, L. Leiffson, A. Sharma, and S. Koziel, "RANS-Based Design Optimization of Dual-Rotor Wind Turbines" *Engineering Computations*, Vol. 35, No. 1, 2018 ([doi: 10.1108/EC-10-2016-0354](https://doi.org/10.1108/EC-10-2016-0354))
- J17 B. R. Agrawal and A. Sharma, "Numerical Analysis of Aerodynamic Noise Mitigation via Leading Edge Serrations for a Rod-Airfoil Configuration", *International Journal of Aeroacoustics*, Vol. 15, No. 8, 2016 ([doi: 10.1177/1475472X16672322](https://doi.org/10.1177/1475472X16672322))
- J16 Z. Wang, W. Tian, A. Ozbay, A. Sharma and H. Hu, "Experimental Study on the Aeromechanics and Wake Characteristics of a Novel Twin-Rotor Wind Turbine in a Turbulent Boundary Layer Flow", *Experiments in Fluids*, Vol. 57, 2016 ([doi:10.1007/s00348-016-2233-6](https://doi.org/10.1007/s00348-016-2233-6))
- J15 A. Rosenberg and A. Sharma, "A Prescribed-Wake Vortex Lattice Method for Preliminary Design of Co-Axial, Dual-Rotor Wind Turbines", *Journal of Solar Energy Engineering: Including Wind Energy and Building Energy Conservation*, Vol. 138, No. 6, 2016 ([doi:10.1115/1.4034350](https://doi.org/10.1115/1.4034350))

- J14 B. Moghadassian, A. Rosenberg, and A. Sharma, “Numerical Investigation of Aerodynamic Performance and Loads of a Novel Dual Rotor Wind Turbine”, *Energies*, Vol. 9, No. 7, 2016 (doi: [10.3390/en9070571](https://doi.org/10.3390/en9070571))
- J13 L. Chen, C. Harding, A. Sharma, and E. MacDonald, “Modeling Noise and Lease Soft Costs Improves Wind Farm Design and Cost-of-Energy Predictions”, *Renewable Energy*, Vol. 97, 2016 (doi: [10.1016/j.renene.2016.05.045](https://doi.org/10.1016/j.renene.2016.05.045))
- J12 H. Ju, R. Mani, M. Vysokliid and A. Sharma, “Investigation of Fan/OGV Interaction Broadband Noise”, *AIAA Journal*, Vol. 53, No. 12, 2015 (doi:[10.2514/1.J053167](https://doi.org/10.2514/1.J053167))
- J11 F. Han, A. Sharma, U. Paliath, and C. M. Shieh, “Multiple Pure Tone Noise Prediction”, *Journal of Sound and Vibration*, Vol. 333, No. 25, 2014 (doi:[10.1016/j.jsv.2014.08.006](https://doi.org/10.1016/j.jsv.2014.08.006))
- J10 A. Rosenberg, S. Selvaraj, and A. Sharma, “A Novel Dual-Rotor Turbine for Increased Wind Energy Capture”, *Journal of Physics: Conference Series*, Vol. 524, 2014 (doi:[10.1088/1742-6596/524/1/012078](https://doi.org/10.1088/1742-6596/524/1/012078))
- J9 E. S. Takle, D. A. Rajewski, J. K. Lundquist, W. A. Gallus Jr., and A. Sharma, “Measurements in support of wind farm simulations and power forecasts: The Crop/Wind-energy Experiments (CWEX)”, *Journal of Physics: Conference Series*, Vol. 524, 2014 (doi:[10.1088/1742-6596/524/1/012174](https://doi.org/10.1088/1742-6596/524/1/012174))
- J8 A. Sharma and H. Chen, “Prediction of Aerodynamic Tonal Noise from Open Rotors”, *Journal of Sound and Vibration*, Vol. 332, No. 6, 2013 (doi:[10.1016/j.jsv.2013.02.027](https://doi.org/10.1016/j.jsv.2013.02.027))
- J7 A. Sharma, S. K. Richards, T. H. Wood, and C. M. Shieh “Numerical Prediction of Exhaust Fan-Tone Noise from High Bypass Aircraft Engines,” *AIAA Journal*, Vol. 47, No. 12, 2009 (doi:[10.2514/1.42208](https://doi.org/10.2514/1.42208))
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Collaborators and Other Affiliations

Collaborators (past four years)

Name	Position	Affiliation
Dr. Baskar Ganapathysubramanian	Professor of Mechanical Engineering	Iowa State University
Dr. Paul Durbin	Prof. of Aerospace Engineering	Iowa State University
Dr. William N. Alexander	Associate Prof. of Aerospace & Ocean Engineering	Virginia Polytechnic Institute
Dr. Hui Hu	Prof. of Aerospace Engineering	Iowa State University
Dr. Partha Sarkar	Prof. of Aerospace Engineering	Iowa State University
Dr. Leifur Leifsson	Associate Prof. of Aerospace Engineering	Purdue University
Dr. Shreyas Narsipur	Assistant Prof. of Aerospace Engineering	Mississippi State University
Dr. Miguel Visbal	CFD Technical Adviser	Air Force Research Lab.
Dr. Daniel Garmann	Lead Developer of FDL3DI	Air Force Research Lab.

Graduate Advisors

Degree	Name	Position	Affiliation
Ph.D. & M.S.	Dr. Lyle N. Long	Professor of Aero Engr.	The Pennsylvania State University

Thesis Advisor and Postgraduate-Scholar Sponsor

Name	Degree	Graduation Date
Hannah Blumhoefer	Ph.D. in Aerospace Engineering	expected 2027
Sudeep Menon	Ph.D. in Aerospace Engineering	expected 2027
Abhishek Barman	Ph.D. in Aerospace Engineering	expected 2025
Zhangming Zeng	Ph.D. in Aerospace Engineering	2024
Sarasija Sudharsan	Ph.D. in Aerospace Engineering	2024
Jiangli Yin	Ph.D. in Aerospace Engineering	2022
Xingeng Wu	Ph.D. in Aerospace Engineering	2020
Mohamad Jafari	Ph.D. in Engineering Mechanics	2019
Andrew Bodling	Ph.D. in Aerospace Engineering	2019
Behnam Moghadassian	Ph.D. in Aerospace Engineering	2017
Aaron Rosenberg	Ph.D. in Aerospace Engineering	2016
Andrew Fung	M.S. in Aerospace Engineering	expected 2024
Ang Li	M.S. in Aerospace Engineering	2022
Andrew Bodling	M.S. in Aerospace Engineering	2017
Xingeng Wu	M.S. in Aerospace Engineering	2017
Vishal Vijay	M.S. in Aerospace Engineering	2017
Bharat Agrawal	M.S. in Aerospace Engineering	2015
Suganthi Selvaraj	M.S. in Aerospace Engineering	2014

Computer Skills

OS	Linux, Mac OS/X, and Windows
Languages	C++, Fortran 90, C, Java, Python, and Perl
Software	MPI/OpenMP, Matlab, Mathematica, Tecplot, Pointwise, Latex, and Cluster suites