BIKASH MAHATO

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RESEARCH AREA OF INTEREST

- Computational Aeroacoustics
- Computational Fluid Dynamics
- Direct Numerical Simulation (DNS)
- Large-Eddy Simulation (LES)
- High-Performance Computing
- Finite Difference Analysis
- Particle-Laden Flows
- Atmospheric Flows

EXPERIENCE

Montana Technological University *August 2024 – Till date*
Adjunct Faculty, Department of Mechanical Engineering *Butte, MT, USA*

· *Course taught:* Computational Fluid Dynamics (EMEC 491), Fundamentals of Heat Transfer (EMEC 326).

Montana Technological University *April 2023 – Till date*
Postdoctoral Researcher, Department of Mechanical Engineering *Butte, MT, USA*

· *Project title:* Numerical analysis of micro-jets applied to cold spray additive manufacturing process.
· *Mentor:* Dr. Peter Lucon and Dr. Nathan Huft
· Investigating the fluid and particle dynamics inside the supersonic cold-spray nozzle using computational fluid dynamics and experimental techniques
· Contributing intellectually to the project, performing research, writing papers, reports, and proposals
· Assisting in the training of graduate and undergraduate students

Florida State University *November 2021 – March 2023*
Postdoctoral Researcher, Department of Mechanical Engineering *Tallahassee, FL, USA*

· *Project title:* Numerical analysis of micro and macro scale atmospheric flows related to wildfire.
· *Mentor:* Dr. Neda Yaghoobian
· Smoke dispersion behavior was numerically investigated under different atmospheric conditions using Large-eddy Simulations (LES).
· Numerically investigated the flight behavior of a smoldering firebrand particle
· Contributed intellectually to the project, performing research, reports, and proposals
· Assisted in the training of graduate and undergraduate students
· Supervised a summer project for high school students in 2022

Indian Institute of Technology Delhi *August 2021 – October 2021*
Research Associate, Department of Mechanical Engineering *New Delhi, India*

· *Project title:* Development of a numerical simulator for microfabricated electrospray thrusters
· *Mentor:* Dr. Supreet Singh Bahga and Prof. Amit Gupta
· Developed finite-difference based incompressible flow solver using fractional-step method

Indian Institute of Technology Bhubaneswar *July 2020 – July 2021*
Research Associate, School of Basic Sciences (Mathematics) *Odisha, India*

· *Project title:* Taylor column phenomena of axially translating sphere in a rotating fluid - a numerical study
· *Mentor:* Prof. T. V. S. Sekhar
· Developed finite-difference based numerical solver using higher-order compact scheme in spherical coordinate system
· Numerically investigated the Taylor column phenomena that appear in low-Reynolds number flows.
· Supervised the research progress and guided graduate students

EDUCATION

Indian Institute of Technology Bhubaneswar, Odisha, India *July 2015 – July 2020*
Ph.D. in Mechanical Engineering

- *Project title:* Numerical Analysis of Aeolian Tone Generation and its Control for Laminar Flow Past Bluff Bodies
- *Mentor:* Dr. Yogesh G. Bhumkar
- Developed finite-difference based direct numerical solver (DNS) using higher-order compact scheme
- Developed aeroacoustics analysis solvers (Lighthill acoustic analogy, Powell's acoustic analogy)
- Investigated sound generation mechanisms for flow over bluff bodies
- Worked as a teaching and research assistant

Indian Institute of Technology Bhubaneswar, Odisha, India *July 2013 – June 2015*
Master of Technology in Mechanical Engineering

- *Project title:* Optimization of the Shape of an Aerofoil Using High Accuracy Numerical Scheme
- *Mentor:* Dr. Yogesh G. Bhumkar and Prof. Swarup K. Mahapatra
- Performed flow over airfoil simulations of low-Reynolds number incompressible flows
- Improved the efficiency of a reflex shaped airfoil by optimizing its shape (used in battery operated UAVs)
- Worked as a teaching and research assistant

West Bengal University of Technology, West Bengal, India *July 2008 – June 2012*
Bachelor of Technology in Mechanical Engineering

- *Project title:* Designing and Modeling of a Cam and Follower Mechanism to Identify Faults in Cam Profile
- *Mentor:* Ms. Chandrani Guha
- Designed and developed a mechanism to detect faults in cam and follower mechanisms.
- Undertook industrial training at New Allenberry Works in Kolkata, focusing on gear manufacturing.
- Completed internship at the MSME tool room (Central Tool Room & Training Centre, Govt. of India), focusing on pattern making and casting.
- Learned to use AutoCAD design software

TECHNICAL STRENGTHS

Computer Languages	Fortran, Python, MATLAB
Software	Tecplot, ParaView, Pointwise, Auto-CAD, CATIA, ANSYS Fluent, SolidWorks
Tools	LaTeX, Microsoft Office, Vim
Operating Systems	Windows, Linux

FELLOWSHIPS AND PROFESSIONAL RECOGNITION

2022	Received travel grant for attending the prestigious **Fire & Climate 2022** conference organized by International Association of Wildland Fire (IAWF).
2020	One of our research article selected as **Editor's Pick** in prestigious **Physics of Fluids** journal
2019	Received Science and Engineering Research Board (SERB, Govt. of India) Young Scientist travel grant for attending international conference
2019	One of our research article selected as **Featured Article** in prestigious **Physics of Fluids** journal
2013	Received Ministry of Human Resource Development (MHRD, Govt. of India) Scholarship for postgraduate study based on All India Graduate Aptitude Test in Engineering (GATE) score
2013	Secured 98.6 percentile in All India Graduate Aptitude Test in Engineering (GATE)
2008	School topper in High School state board examination

SOCIETIES AND SERVICES

2020 - Present	*Reviewer* – Physics of Fluids
2022 - Present	*Member* – American Physical Society (APS)
2024 - Present	The Minerals, Metals & Materials Society (TMS)
2022 - 2023	*Member* – International Association of Wildland Fire (IAWF)

PUBLICATIONS

Journal Publications

[1] Ritambhara Raj Dubey, **Bikash Mahato**, and Neda Yaghoobian. Effect of the Atmospheric Stability Condition on Buoyant Plume Dynamics. *Physics of Fluids*, 38(2):1–18, 2024.

[2] **Bikash Mahato**, Saurabh Saxena, and Neda Yaghoobian. Aerodynamic force modifications of a spherical particle with varying temperature: a study of an idealized firebrand. *Theoretical and Computational Fluid Dynamics*, 38(2):1–18, 2024.

[3] Vivek S Yadav, Naveen Ganta, **Bikash Mahato**, Manoj K Rajpoot, and Yogesh G Bhumkar. New time-marching methods for compressible Navier-Stokes equations with applications to aeroacoustics problems. *Applied Mathematics and Computation.*, 419:126863, 2022.

[4] Praveen K. Maurya, Vivek S. Yadav, **Bikash Mahato**, Naveen Ganta, Manoj K. Rajpoot, and Yogesh G. Bhumkar. New optimized implicit-explicit Runge-Kutta methods with applications to the hyperbolic conservation laws. *Journal of Computational Physics.*, 446:110650, 2021.

[5] **Bikash Mahato**, Naveen Ganta, and Yogesh G. Bhumkar. Effective Control of Aeolian Tone using a pair of Splitter Plates. *Journal of Sound and Vibration.*, 494:115906, 2021.

[6] Naveen Ganta, **Bikash Mahato**, and Yogesh G. Bhumkar. Prediction of the aerodynamic sound generated due to flow over a cylinder performing combined steady rotation and rotary oscillations. *The Journal of the Acoustical Society of America*, 147(1):325–336, 2020.

[7] **Bikash Mahato**, Naveen Ganta, and Yogesh G. Bhumkar. Mitigation of Aerodynamic Sound for a Laminar Flow past a Square Cylinder using a Pair of Cowl Plates. *Physics of Fluids*, 32(7):076108, 2020.

[8] **Bikash Mahato**, Naveen Ganta, and Yogesh G Bhumkar. Computation of aeroacoustics and fluid flow problems using a novel dispersion relation preserving scheme. *Journal of Theoretical and Computational Acoustics*, 28(1):1850063, 2020.

[9] Naveen Ganta, **Bikash Mahato**, and Yogesh G. Bhumkar. Analysis of sound generation by flow past a circular cylinder performing rotary oscillations using direct simulation approach. *Physics of Fluids.*, 31(2):026104, 2019.

[10] Naveen Ganta, **Bikash Mahato**, and Yogesh G. Bhumkar. Modulation of sound waves for flow past a rotary oscillating cylinder in a non-synchronous region. *Physics of Fluids*, 31(9):096103, 2019.

[11] **Bikash Mahato**, Naveen Ganta, and Yogesh G. Bhumkar. Numerical Investigation of Sound Generation due to Laminar Flow Past Elliptic Cylinders. *Numerical Mathematics: Theory, Methods and Applications*, 13(1):27–62, 2019.

[12] Jitenjaya Pradhan, Saksham Jindal, **Bikash Mahato**, and Yogesh G. Bhumkar. Joint optimization of the spatial and the temporal discretization scheme for accurate computation of acoustic problems. *Communication in Computational Physics*, 24(2):408–434, 2018.

[13] **Bikash Mahato**, Naveen Ganta, and Yogesh G. Bhumkar. Direct simulation of sound generation by a two-dimensional flow past a wedge. *Physics of Fluids*, 30(9):096101, 2018.

[14] Jitenjaya Pradhan, **Bikash Mahato**, Satish D. Dhandole, and Yogesh G. Bhumkar. Construction, analysis and application of coupled compact difference scheme in computational acoustics and fluid flow problems. *Communication in Computational Physics*, 18(4):957–984, 2015.

Conferences

[1] **Bikash Mahato**, Jay Yoder, Gloyd Simmons, Nathan Huft, Isaac Nault, and Peter Lucon. Investigation of particle dynamics in a low-pressure cold spray additive manufacturing process. In *77th Annual Meeting of the American Physical Society Division of Fluid Dynamics*. Salt Lake City, UT, November 2024.

[2] **Bikash Mahato**, Jay Yoder, Gloyd Simmons, Nathan Huft, Isaac Nault, and Peter Lucon. Numerical and experimental investigation of particle dynamics in cold spray additive manufacturing process. In *International Mechanical Engineering Congress & Exposition (IMECE)*. Portland, OR, November 2024.

[3] **Bikash Mahato**, Jay Yoder, Katelyn Rapp, Gloyd Simmons, Nathan Huft, Isaac Nault, and Peter Lucon. Particle dynamics of a low-pressure cold spray system. In *14th Cold Spray Action Team Meeting*. Worcester, MA, June 2024.

[4] Ritambhara Dubey, **Bikash Mahato**, and Neda Yaghoobian. Dynamics of buoyant plumes in stratified atmospheric boundary layer. In *76th Annual Meeting of the American Physical Society Division of Fluid Dynamics*. Washington, DC, November 2023.

[5] **Bikash Mahato**, Jay Yoder, Gloyd Simmons, Nathan Huft, and Peter Lucon. A dns investigation of aeroacoustic noise generation in cold spray additive manufacturing. In *76th Annual Meeting of the American Physical Society Division of Fluid Dynamics*. Washington, DC, November 2023.

[6] **Bikash Mahato**, Saurabh Saxena, and Neda Yaghoobian. Vortex dynamics of a smoldering firebrand particle. In *75th Annual Meeting of the American Physical Society Division of Fluid Dynamics*. Indianapolis, IN, USA, November 2022.

[7] **Bikash Mahato**, Saurabh Saxena, and Neda Yaghoobian. A detailed dns-surface energy balance analysis of a flying firebrand particle. In *Florida Fluids Symposium-I*. Department of Mechanical Engineering, Florida State University, May 2022.

[8] **Bikash Mahato**, Saurabh Saxena, and Neda Yaghoobian. Predicting the flight behavior of single smoldering firebrand particle: A detailed computational fluid dynamics study. In *Fire & Climate Conference: Impacts, Issues and Futures*. International Association of Wildland Fire, May 2022.

[9] Bapuji Sahoo, **Bikash Mahato**, and T. V. S. Sekhar. A higher-order numerical analysis to study the flow physics and to optimize the design of a short-dwell blade coaters for higher efficiency. In *Journal of Physics: Conference Series*, volume 2090(1), page 012053. IOP Publishing, November 2021.

[10] Naveen Ganta, **Bikash Mahato**, and Yogesh G. Bhumkar. Characteristics of sound radiated due to flow around a rotationally oscillating cylinder. In *INTER-NOISE and NOISE-CON Congress and Conference Proceedings*, volume 259(6), pages 3341–3350. Institute of Noise Control Engineering, 2019.

[11] **Bikash Mahato**, Naveen Ganta, and Yogesh G. Bhumkar. Control of aeroacoustic noise generation during flow past a circular cylinder using splitter plate. In *INTER-NOISE and NOISE-CON Congress and Conference Proceedings*, volume 259(6), pages 3839–3848. Institute of Noise Control Engineering, 2019.

[12] Naveen Ganta, **Bikash Mahato**, and Yogesh G. Bhumkar. Numerical analysis of aerodynamic noise due to flow past a circular cylinder undergoing rotary oscillations. In *Fluid Mechanics and Fluid Power (FMFP-2018)*, Indian Institute of Technology Bombay, Mumbai, December 2018. National Society for Fluid Mechanics and Fluid Power.

[13] **Bikash Mahato**, Naveen Ganta, and Yogesh G. Bhumkar. Effect of axis-ratio on the sound generation from elliptic cylinder. In *Fluid Mechanics and Fluid Power (FMFP-2018)*, Indian Institute of Technology Bombay, Mumbai, December 2018. National Society for Fluid Mechanics and Fluid Power.

[14] Naveen Ganta, **Bikash Mahato**, and Yogesh G. Bhumkar. Aerodynamic noise behavior due to flow over oval–shaped cylinders. In *WESPAC-2018*, CSIR–National Physical Laboratory, New Delhi, November 2018. Acoustical Society of India.

[15] **Bikash Mahato**, Naveen Ganta, and Yogesh G. Bhumkar. Effect of splitter plate on the sound generation during flow past circular cylinder. In *WESPAC-2018*, CSIR–National Physical Laboratory, New Delhi, November 2018. Acoustical Society of India.

[16] Naveen Ganta, **Bikash Mahato**, and Yogesh G. Bhumkar. Analysis of aerodynamic noise for flow past a circular cylinder performing rotary oscillations in the non-synchronization region. In *32nd National Convention of Aerospace Engineers (NCAE 2018)*, pages 146–150, Birla Institute of Technology, Ranchi, October 2018. The Institutions of Engineers.

[17] **Bikash Mahato**, Naveen Ganta, and Yogesh G. Bhumkar. Effect of mach number on the sound generation due to flow past an elliptic cylinder. In *32nd National Convention of Aerospace Engineers (NCAE 2018)*, pages 141–145, Birla Institute of Technology, Ranchi, October 2018. The Institutions of Engineers.

[18] Naveen Ganta, **Bikash Mahato**, and Yogesh G. Bhumkar. Numerical analysis of an acoustic field behavior for flow past corrugated cylinder. In *25th International Congress on Sound and Vibration*, Heroshima, Japan, July 2018. International Institute of Acoustics and Vibration (IIAV).

[19] **Bikash Mahato**, Naveen Ganta, and Yogesh G. Bhumkar. Analysis of acoustic field originating from flow past elliptic cylinders using space–time accurate drp scheme. In *25th International Congress on Sound and Vibration*, Heroshima, Japan, July 2018. International Institute of Acoustics and Vibration (IIAV).

[20] **Bikash Mahato** and Yogesh G. Bhumkar. Numerical investigation of the effects of corrugated cylinder geometries on the acoustic field. In *INTER-NOISE and NOISE-CON Congress and Conference Proceedings*, volume 255(5), pages 2313–2322. Institute of Noise Control Engineering, 2017.

Invited Lectures

[1] **Bikash Mahato**. Factors contributing to errors in computational aeroacoustics. In *Online Workshop on Aeroelasticity, Biomechanics and Finite Element Analysis, 13–14 April*. Indian Institute of Technology (Indian School of Mines), Dhanbad, IIT(ISM) Dhanbad, 2024.

Poster Presentations

[1] Jay Yoder, **Bikash Mahato**, Katelyn Rapp, Gloyd Simmons, Nathan Huft, Isaac Nault, and Peter Lucon. Flow and particle characterization of low-pressure cold spray systems. In *Cold Spray Action Team Meeting, June 12 – 13*. Worcester, MA, 2024.

[2] Jay Yoder, **Bikash Mahato**, Gloyd Simmons, Nathan Huft, and Peter Lucon. Flow characterization of low-pressure cold spray systems. In *Cold Spray Action Team Meeting, June 20 – 21*. Worcester, MA, 2023.

[3] **Bikash Mahato**, Saurabh Saxena, and Neda Yaghoobian. Flight behavior of a smoldering spherical particle. In *First Direct In-person Colloquium on Vortex Dominated Flows (DisCoVor), May 17–20*. École polytechnique fédérale de Lausanne (EPFL), 2022.

[4] **Bikash Mahato**, Ganta Naveen, and Yogesh G. Bhumkar. Reduction of drag and aeolian tone generated due to flow past circular cylinder using splitter plates. In *National Science Day Research Demonstration, February 28*. Indian Institute of Technology Bhubaneswar, 2019.

Other Publications

[1] I.D. Santos, **Bikash Mahato**, B. Bornhoft, S. S. Jain, and Neda Yaghoobian. Lagrangian subgrid-scale modeling applied to evolving firebrand particle transport. In *Proceedings of the Summer Program*. Center for Turbulence Research, Stanford University, 2022.