Omkar B. Shende

CONTACT

3520 Green Court, Ann Arbor, MI 505-000-0000
LANL SPARC oshende@lanl.gov

EXPERIENCE

Los Alamos National Laboratory *2025 –*
Postdoctoral Research Associate
Working in the Continuum Models and Numerical Methods (XCP-4) group

Lawrence Livermore National Laboratory *2024*
Graduate Researcher
Performed ILES and analysis of Richtmyer-Meshkov instabilities in multi-component flow to support strategic deterrence initiatives, including as an DSTI intern

Argonne National Laboratory *2016*
SULI Intern
Developed high secondary electron emission coefficient thin films using atomic layer deposition on microchannel plates and modeled mechanisms for gain with increased oxide thickness

EDUCATION

Stanford University, Stanford, CA

Ph.D., Mechanical Engineering Jan. 2025

- Doctoral Advisor: Prof. Ali Mani
- Dissertation: Reduced-Order Modeling for Reactive Scalars in Turbulent Flows

M.S., Mechanical Engineering June 2020

- Concentration: Flow Physics and Computational Engineering

Princeton University, Princeton, NJ

B.S.E., Mechanical and Aerospace Engineering June 2018

- Certificate: *Materials Science and Engineering*
- Graduated *summa cum laude*, Phi Beta Kappa, Sigma Xi, Tau Beta Pi
- Thesis: On the Efficacy and Accuracy of Models for Large Eddy Simulations of Turbulent Premixed Combustion

RESEARCH ACTIVITIES

Mani Group *2019 – 2024*
Stanford University
Ph.D. Student

- Reduced-order modeling for turbulent reacting flows
- Eddy diffusivity for dilute multiphase turbulence
- Quantifying Reynolds stress decay and transport in anisotropic turbulence
- Developing solvers for numerical simulations of fluid flows

Computational Turbulent Reacting Flow Laboratory *2017 – 2018*
Princeton University
Student Researcher
Studied LES model efficacy using *a priori* and *a posteriori* analysis of DNS of turbulent, premixed flow to analyze shear- versus combustion-driven turbulence

Manuscripts

1. K. Ferguson, B. J. Colombi, K. M. Church, **O. B. Shende**, Y. Zhou, J. W. Jacobs. *Experiments and Simulations on the Richtmyer-Meshkov Instability with a Thin Intermediate Layer.* In Preparation. 2025.
2. **O. B. Shende**, B. E. Morgan, and Y. Zhou. *Shock tube simulations for the three-layer Richtmyer-Meshkov instability with single- and multi-mode perturbations.* Physics of Fluids 37. 2025. 2024 ICTAM invited paper, featured article
3. K. P. Griffin, B. Lee, G. Vijayakumar, B. Bornhoft, **O. B. Shende**, and M. P. Whitmore. *Pressure-gradient-based RANS model for separation in transitional and turbulent flows.* Center for Turbulence Research Proceedings of the Summer Program. 2024.
4. A. Shih, S. J. Chung, **O. B. Shende**, S. E. Herwald, A. M. Vezeridis, and G. G. Fuller. *Viscoelastic measurements of abscess fluids using a magnetic stress rheometer.* Physics of Fluids 36. 2024. Cover article, featured article
5. T. Homan, **O. B. Shende**, and A. Mani. *A model form for Reynolds stress decay informed by anisotropically forced homogeneous turbulence.* Physical Review Fluids 9. 2024.
6. **O. B. Shende**, L. Storan, and A. Mani. *A Model for Drift Velocity Mediated Scalar Eddy Diffusivity in Homogeneous Turbulent Flows.* Journal of Fluid Mechanics 989. 2024.
7. N. J. Wei and **O. B. Shende**. *Modeling unsteady loads on wind-turbine blade sections from periodic structural oscillations and impinging gusts.* In Preparation. 2024.
8. **O. B. Shende** and A. Mani. *A Nonlocal Extension of Dispersion Analysis for Closures in Reactive Flows.* In Preparation. 2022.
9. **O. B. Shende** and A. Mani. *Closures for Multi-Component Reacting Flows based on Dispersion Analysis.* Physical Review Fluids 7. 2022.
10. J. Guo and **O. Shende**. *On the assessment of symmetries in large-eddy simulation subgrid-scale models.* Center for Turbulence Research Annual Research Briefs. 2020.
11. M. Kang, I. Beskin, A. A. Al-Heji, **O. Shende**, S. Huang, S. Jeon, and R. S. Goldman. *Evolution of ion-induced nanoparticle arrays on GaAs surfaces.* Applied Physics Letters 104. 2014.

Presentations

1. **O. Shende**, T. Homan, and A. Mani. *Reynolds stress decay modeling informed by anisotropically forced homogeneous turbulence.* 77th Annual Meeting of the APS Division of Fluid Dynamics. 2024.
2. R. Zangeneh, **O. Shende**, and A. Mani. *Assessment of anisotropy in the decay term of the dissipation equation for Reynolds stress transport models.* 77th Annual Meeting of the APS Division of Fluid Dynamics. 2024.
3. **O. B. Shende** *A model for drift velocity mediated scalar eddy diffusivity in homogenous turbulent flows.* At the National Renewable Energy Laboratory. 2024.
4. **O. B. Shende** and A. Mani. *Particle drift modifies turbulent dispersion.* Thermal and Fluid Sciences Affiliate Conference Poster Session. 2024.
5. **O. Shende** and A. Mani. *Quantifying the Relative Importance of Transport and Reaction Closures in a Canonical Premixed Turbulent Flow Setting.* 76th Annual Meeting of the APS Division of Fluid Dynamics. 2023.

6. T. Homan, **O. Shende**, D. L. Lavacot, and A. Mani. *A Model Form for Reynolds Stress Decay Informed by Analysis of Anisotropically Forced Homogeneous Turbulence.* 76th Annual Meeting of the APS Division of Fluid Dynamics. 2023.
7. **O. Shende** and A. Mani. *Assessment of a Nonlocal Closure Model for Scalar Fields in Reacting Turbulent Flows.* 75th Annual Meeting of the APS Division of Fluid Dynamics. 2022.
8. K. P. Griffin, **O. Shende**, and J. Guo. *An illustrative example of the symbiosis between community outreach and internal science-communication training.* 74th Annual Meeting of the APS Division of Fluid Dynamics. 2021.
9. **O. Shende** and A. Mani. *Scalar transport closure for a nonlinear reaction problem.* 74th Annual Meeting of the APS Division of Fluid Dynamics. 2021.
10. **O. Shende** and A. Mani. *Weakly-Nonlinear Extension of Dispersion Analysis for Multi-Component Reacting Flows.* 73rd Annual Meeting of the APS Division of Fluid Dynamics. 2020.
11. **O. Shende** and A. Mani. *A dispersion model for multi-component reacting flows.* 2020 Spring Meeting of the Western States Section of The Combustion Institute. 2020. *Meeting cancelled due to SARS-CoV-2 pandemic*
12. **O. Shende** and A. Mani. *A Dispersion Model for Turbulent, Multi-Component Reacting Flows.* 72nd Annual Meeting of the APS Division of Fluid Dynamics. 2019.
13. **O. B. Shende** and M. Ihme. *Flame structure analysis of the Hi-Pilot stratified premixed jet flames using large eddy simulations.* 11th U.S. National Combustion Meeting. 2019.
14. **O. Shende**, A. Mane, and J. Elam. *ALD-Grown SEE Layer Studies for Microchannel Plates for Photodetection.* 2017 Materials Research Society Spring Meeting. 2017.

Awards & Grants

NSF ACCESS Award *2024*
ACCESS Discover request awarded for studying turbulence model closures on allocated resources like Stampede3 and OSN

Argonne Training Program on Extreme-Scale Computing *2022*
Selected through competitive application process to attend two-week intensive HPC workshop at Argonne National Laboratory

NSF Extreme Science and Engineering Discovery Environment Award *2019*
XSEDE Startup request awarded for studying binary reactions in homogenous isotropic turbulence on Stampede2

Stanford Graduate Fellowship in Science and Engineering *2018 – 2023*
Selected as recipient of fellowship awarded to outstanding students pursuing doctoral degrees in science and engineering

National Science Foundation Graduate Research Fellowship *2018 – 2023*
Selected as recipient of national fellowship awarded to outstanding students pursuing research degrees

Sigma Xi Book Award *2018*
Awarded for writing one of the most outstanding senior theses in science and engineering at Princeton University

Barry Goldwater Scholarship *2017*
Selected by a Congressional agency as among the top undergraduates in the nation on the basis of merit and research potential in STEM fields

Shapiro Prize for Academic Excellence *2015, 2016*
Honored as among the top 40 students at Princeton University in sophomore and freshman years by academic standing

Service

NSF Panelist *Present*
Served as panelist and reviewer for NSF ACCESS computational allocations.

Reviewer and Panelist *Present*
Provided peer review for *Physics of Fluids* and *Center for Turbulence Research Annual Research Briefs*.

Teaching Assistant *2021, 2023*
Helped with homework/exam creation and grading, held office hours and related meetings, and guest lectured for ME 351A and ME351B, the introductory graduate fluid mechanics sequence.

Mechanical Engineering Graduate Student Committee *2018 – 2023*
Served as committee member to run qualifying exam information panels, provide feedback, and manage other events to enhance academic and social life for department students.

seeME *2018 – 2024*
Served as organizing team member and teacher to outreach program to high school and middle school students underrepresented in STEM fields.

Stanford SURF *2020 – 2021*
Served as a mentor to undergraduates participating in a School of Engineering summer outreach program.

Skills

Software: C,C++, Java, Bash, ZSH, Fortran, Python, LabVIEW, LaTeX, MATLAB, Mathematica, OpenMP, Intel MPI
CAE/CAD: PTC, Siemens PLM, STK, and Dassault CAE software, including NASTRAN
Citizenship: US