Dana Lynn Ona-Lansigan Lavacot

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EDUCATION

Institution	Degree	GPA	Duration
Stanford University	Ph.D., Mechanical Engineering	4.06/4.0	2019 - 2025
Stanford University	M.S., Mechanical Engineering	4.05/4.0	2019 - 2021
UC Berkeley	B.S., Mechanical Engineering	3.86/4.0	2015 - 2019

AWARDS

Stanford Graduate Fellowship in Science & Engineering 2019
UC Berkeley High Honors, *for GPAs in top 7% of at graduation* 2019
UC Berkeley Dean's List, *semesterly distinction for GPAs in top 10%* 2015-2018
Boeing Scholarship, *awarded to outstanding STEM undergraduates* 2016
Banatao Scholarship, *awarded to 4 outstanding Filipino-American students in STEM* 2015

RESEARCH

Nonlocality in Turbulent Rayleigh-Taylor Mixing January 2020 - Present
PIs: Ali Mani @ Stanford, Brandon Morgan @ LLNL (Defense Science & Technology Internship)

- Examined eddy diffusivity in Rayleigh-Taylor mixing using the Macroscopic Forcing Method for determining closure operators, illustrating the importance of nonlocality
- Conducted high-fidelity simulations using LLNL's Ares (C/C++) and Pyranda (Python/Fortran) hydrodynamics codes on a computer cluster
- Developed the k–L–F model, which is a nonlocal modification of a gradient-diffusion model and has been implemented in LLNL codes

Forced Turbulence Simulations for Model Tuning November 2022 - Present
PI: Ali Mani *Stanford University*

- Adapted a parallel pseudo-spectral code (C++) for forced turbulence simulations
- Utilizing results to tune turbulent transport models in the Reynolds stress framework

Deep Learning for Geometric Signals August 2017 - May 2019
PI: Philip Marcus, Mentor: Chiyu Jiang *University of California, Berkeley*

- Derived analytical gradients for the Deep Differentiable Shape Layer (DDSL), a neural network layer designed for unstructured grids
- Built and trained a convolutional neural network in Pytorch for an airfoil shape optimization task to demonstrate the effectiveness of the DDSL

PUBLICATIONS

Lavacot, D. L. O.-L., Morgan, B. E., and Mani, A. Development and assessment of turbulence models for Rayleigh-Taylor mixing using the macroscopic forcing method. In prep.

Lavacot, D. L. O.-L., Mani, A, and Morgan, B. E. Atwood effects on nonlocality of the mean scalar transport operator in three-dimensional Rayleigh-Taylor mixing. In review. arXiv:2505.09850

Lavacot, D. L. O.-L., Liu, J., Morgan, B. E., and Mani, A. New techniques for improved statistical convergence in quantification of eddy diffusivity moments. In review. arXiv:2503.06418.

Lavacot, D. L. O.-L., Liu, J., Williams, H., Morgan, B. E., and Mani, A. (2024). Assessment of Nonlocality of Mean Scalar Transport in Rayleigh-Taylor Instability Using the Macroscopic Forcing Method. *Journal of Fluid Mechanics*, 985, A47.

Jiang, C., **Lansigan, D. L. O.**, Marcus, P., and Niessner, M. (2019). DDSL: Deep Differentiable Simplex Layer for Learning Geometric Signals. In *Proceedings of the IEEE/CVF International Conference on Computer Vision* (pp. 8769-8778).

CONFERENCE PRESENTATIONS

Lavacot, D. L. O.-L., Morgan, B. E., and Mani, A. (2024). Atwood effects on nonlocality of mean scalar transport in three-dimensional Rayleigh-Taylor Instability. Presented at the APS Division of Fluid Dynamics 77th Annual Meeting, Session X27.00006, Salt Lake City, Utah.

Lavacot, D. L. O.-L., Liu, J., Morgan, B. E., and Mani, A. (2023). Assessment of RANS models for Rayleigh-Taylor mixing using the Macroscopic Forcing Method. Presented at the APS Division of Fluid Dynamics 76th Annual Meeting, Session J43.00003, Washington, D.C.

Lavacot, D. L. O.-L., Liu, J., Morgan, B. E., and Mani, A. (2022). Continuing Investigations of Nonlocality in Rayleigh-Taylor Instability Using the Macroscopic Forcing Method." Presented at the APS Division of Fluid Dynamics 75th Annual Meeting, Session J22.00005, Indianapolis, Indiana.

Lansigan, D. L. O., Liu, J., Williams, H., Morgan, B. E., and Mani, A. (2021). Evaluating the Importance of Nonlocal Eddy Diffusivity for Rayleigh Taylor Instability. Presented at the APS Division of Fluid Dynamics 74th Annual Meeting, Session E11.00009, Phoenix, Arizona.

Lansigan, D. L. O., D. Park, and Mani, A. (2020). An Accelerated Macroscopic Forcing Method for Determining Eddy Viscosity Operators. Presented at the APS Division of Fluid Dynamics 73rd Annual Meeting, Session X11.00009, Chicago, Illinois.

Lansigan, D. L. O., Jiang, C., and Marcus, P. (2018). Neural Network Powered Adjoint Methods: Gradient Based Shape Optimization with Deep Learning. Presented at the APS Division of Fluid Dynamics 71st Annual Meeting, Session F32.00002, Atlanta, GA.

TEACHING

Vector Calculus for Engineers September - December 2024
Undergraduate freshman course, 140 students *Stanford University*

- Hosted weekly office hours, graded problem sets and exams
- Delivered a guest lecture on Green's Theorem

Turbulence April - June 2023
Graduate course, 20 students *Stanford University*

- Hosted weekly office hours, designed and graded problem sets and exams

Numerical Methods April - June 2022
Graduate course, 20 students *Stanford University*

- Hosted weekly office hours, designed and graded problem sets and exams, developed Matlab tutorial

Intro to Circuits & Linear Algebra August 2018 - May 2019
Undergraduate course, 1,000 students *University of California, Berkeley*

- Facilitated two weekly discussion sections of 50 students each
- Developed and graded exam problems, taught mini-lectures, directed class exercises

INDUSTRY EXPERIENCE

Aero/CFD/HPC Tools Intern June - August 2023
General Atomics, ASI *Poway, CA*

- Assessed capabilities of STAR-CCM+ solver through 2D & 3D RANS simulations of airfoils and aircraft, as part of evaluation presented to Engineering VP
- Investigated STAR-CCM+ implementaiton of the γ–Re_θ transition model, identifying settings crucial for accuracy
- Stress-tested software's meshing and simulation capabilities with a simulation of flow over the MQ-9B aircraft, the largest simulation of the study (180M+ cells)

Computer Aided Engineering Intern May - August 2018
The Aerospace Corporation *El Segundo, CA*

- Developed a Matlab tool for visualizing ignition overpressure (IOP) waves and calculating their resulting forces on launch vehicles during lift-off
- Developed a Python tool to streamline analysis of ground winds loads on launch vehicles at lift-off, reducing mutiple Excel pages to a single user-friendly code
- Designed, modeled in SolidWorks, and 3D printed multi-component assemblies for prototyping, research, and STEM outreach

SERVICE

Teacher for STEM Outreach March 2022 - May 2025
SeeME *Stanford University*

- Designed one-hour hands-on classes on computational modeling (2023-25) and paper airplanes (2022) to teach engineering principles to students grades 7-10.
- Engaged classes of around 20 students each during annual STEM outreach event

PROFESSIONAL AFFILIATIONS

American Physical Society 2018 - Present
Tau Beta Pi, Engineering Honor Society 2016 - Present

TECHNICAL SKILLS

Concepts	CFD, HPC, turbulence modeling, machine learning, 3D printing
Computer Languages	Python, Matlab, C++, Bash, HTML, CSS
Software & Tools	Siemens STAR-CCM+, OpenFOAM, SolidWorks, SLURM, GitHub, VisIt, Pytorch, Jupyter, LaTeX, UltiMaker Cura
Operating Systems	Windows, MacOS, Linux