ARTURO RODRIGUEZ

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WORK

Texas A&M University - Kingsville (TAMUK)

Assistant Professor — *Fall 2025 - Present*
Department of Mechanical and Industrial Engineering

Research Assistant Professor — *Spring 2025 - Summer 2025*
Department of Mechanical and Industrial Engineering

EDUCATION

The University of Texas at El Paso (UTEP)

Doctor of Philosophy (Ph.D.) — *Graduation Date: Fall 2024*
Department of Aerospace and Mechanical Engineering — GPA: 4.00/4.00
Advisor: Prof. Vinod Kumar — NSF GRFP Fellow & DOE NNSA NGFP Fellow

Bachelor of Science (B.S.) — *May 2020*
Summa cum laude, Honors Degree — Overall GPA: 3.96/4.00
Department of Mechanical Engineering — Major GPA: 4.00/4.00
Fast Track (BS/MS) Student — Graduate GPA: 4.00/4.00

BACKGROUND

Google Scholar: https://scholar.google.com/citations?user=uEXTQmAAAAAJ&hl=en
Articles: 111, Citations: 195, h-index: 7, i10-index: 4
Researchgate: https://www.researchgate.net/profile/Arturo_Rodriguez12
Research Items: 158, Citations: 179, h-index: 7, Reads: 36,768, Research Interest: 504.1
LinkedIn: https://www.linkedin.com/in/arturo-rodriguez-utep/

RESEARCH INTERESTS

Fluid Mechanics, Turbulence, and Computational Fluid Dynamics
Scientific Machine Learning, Scientific Computing, and Machine Learning

EXPERIENCES

Purdue University — Feb 2022 - April 2024
School of Aeronautics and Astronautics (Collaborator) — *Worked: Remotely*

- Preparing the analyzes for Hypersonic Sled Track Test at Holloman Air Force Base
- Boundary-Layer Transition focused on Roughness Effects and Small Particle Impact
- Creating Hypersonic CFD Simulations to get Shock Waves Shapes and Pressure Distributions
- Using Harris Code (B-L Equations) and 1D Heat Transfer for the Thermo-Fluid Effects Predictions

Mentors: Drs. Steven P. Schneider (Purdue) and Vinod Kumar (UTEP)

Sandia National Laboratories — Aug 2023 - Oct 2023
Scientific Machine Learning Department (Researcher) — *Worked: Remotely*

- Partition of Unity Physics-Informed Neural Networks (POU-PINNs)

SNL Mentors: Drs. Mauro Perego and Jonas A. Actor, UPENN Mentor: Nathaniel A. Trask

Sandia National Laboratories May 2023 - Aug 2023
Computational Mathematics Department (Visiting Researcher) *Albuquerque, NM*

- Developed and programmed Partition of Unity Physics-Informed Neural Networks (POU-PINNs)
- Applied method to ice-sheet modeling
- In the works to being applied to real-world problems: Realistic scenarios and conditions

Mentor: Drs. Nathaniel A. Trask, Mauro Perego, and Jonas A. Actor

Air Force Research Laboratory March 2022 - Aug 2023
Holloman High Speed Test Track (Collaborator) *Worked: Remotely*

- Helping with project management: creating agendas, providing updates to PMs, etc.

Mentors: Capt. Jinhee F. Byun (AFRL) and Vinod Kumar (UTEP)

NASA Jet Propulsion Laboratory (JPL) Oct 2022 - May 2023
Advanced Thermal Concepts and Analysis (Consultant) *Worked: Remotely*

- Collaborated with another student on Oscillating Heat Pipes Calculations and Validation
- In support of improving the Thermal Management Systems for future NASA missions
- Our calculations show better performance in comparison to state-of-the-art results

POCs: Cesar Diaz-Caraveo and Drs. Scott N. Roberts and Takuro Daimaru

DOE NNSA Headquarters & Pacific Northwest National Laboratory Jun 2021 - Jun 2022
NGFP Fellow - Helped with Studies and Management (Fellow) *Worked: Remotely*

- Budget-Constrained Prioritization Recapitalization of Non-Nuclear Environmental Testing Facilities
- NA-194/SNL Saturn (X-Ray Radiation Machine) Recapitalization Management
- NextGen LEP Study at LLNL for increasing Manufacturing Throughput

Mentor: Andrew P. Trotta, P.E.

Brown University Sept 2020 - Feb 2021
Applied Mathematics - CRUNCH Group (Collaborator) *Worked: Remotely*

- Conducted Research on PINNs applied to Hypersonic Cones
- Looked at different ways to create variations of PINNs, leading to LSTM-PINNs
- Attended the CRUNCH Seminar Series every Friday for 2 hours

Mentors: Drs. George Em Karniadakis (Brown) & Vinod Kumar (UTEP)

Air Force Research Laboratory Jan 2021 - April 2021
Maui Optical and Supercomputing Site (AFRL Scholar) *Worked: Remotely*

- Produced a correct (Validated) phase screen on Gaussian Media
- Introduced intermittency to the phase screen using a log-normal distribution for fluid flow conditions
- Studied the Fractal Dimension to quantify the self-similarity in phase screens

Mentor: Dr. Venkata S.R. Gudimetla

California State University, Northridge Sept 2020 - Jan 2021
Mechanical Engineering - Dr. Hamid Johari's Group (Collaborator) *Worked: Remotely*

- Used XFOIL to validate experimental water tunnel data
- Studied many airfoil geometries at low Reynolds numbers
- Wrote pre & post processing code for the XFOIL version in MATLAB

Mentor: Dr. Hamid Johari

Sandia National Laboratories May 2020 - Aug 2020
Aerosciences Department (Undergraduate R&D Intern) *Worked: Remotely*

· Performed verification and validation tests on a Qstar ablation model in SPARC
· Generated meshes and performed aerodynamic analysis of a supersonic bullet
· Helped develop and debug code with automatic mesh generation capabilities for re-entry vehicles
· Performed aero-thermal analysis of a sphere-ogive vehicle on an ascent and descent trajectory
Mentor: Drs. Paul M. Delgado and Brian A. Robbins

The Johns Hopkins University Applied Physics Laboratory May 2019 - Aug 2019
Oceanic, Atmospheric, and Remote Sensing Sciences Group (Technical Aide) *Laurel, MD*

· Simulated a secondary propulsion unit and post-processed the results using Tecplot
· Created an overlapping mesh using Pointwise for a secondary propulsion unit
· Used MATLAB to visualize and calculate wave frequencies in the ocean
Mentor: Dr. Jay H. Phelps and Kenneth M. Kalumuck

Sandia National Laboratories May 2018 - Aug 2018
Fire Science and Technology Department (Undergraduate R&D Intern) *Albuquerque, NM*

· Study the behavior of different turbulence models for helium plume combustion and urban dispersion
· Created different meshes in Cubit and evaluated their convergence
· Post-processed the CFD results and learned how to validate the results using Python
Mentors: Drs. Alexander L. Brown, and John C. Hewson

The University of Texas at Arlington Jun 2013 - Aug 2013
Civil Engineering - Yu's Research Group (High School SIEMENS Researcher) *Arlington, TX*

· Measured the water content of some soil samples using the TDR method
· Created graphs that demonstrate the distribution of grains in the soil using sieve analysis
· Published on the UBMS website under "Soil mechanics: Determination of water content ..."
Mentors: Drs. Xinbao Yu, and Nan Zhang

UTEP RESEARCH EXPERIENCES

Multi-Physics Multi-Scale Computational Modeling Laboratory May 2015 - Present
Graduate/Undergraduate Research

· Simulating Aerodynamics of Airfoils at Ultra Low Reynolds Numbers Using Panel Methods
· Using different Image Processing Methods to Deblur Images
· Created BLT Experimental Set-Up

· Using Cause and Effect Inference to predict Boundary-Layer Transition
· Created a code that can predict the fractal dimension using Box-Counting
· Coded the Fourier Transform to predict velocity profile in Atmospheric Turbulence

· Perform parametric studies and sensitivity analysis studies for atmospheric turbulence simulations
· Post-Process my atmospheric turbulence results and use them to predict subsequent data using DL
· Use atmospheric turbulence data to perform frequency analysis

· Study atmospheric turbulence with the desire to improve remote sensing imaging
· Apply the LES turbulence model to find velocity conditions in the domain of interest
· Post-Process ANSYS Fluent results to analyze contour lines found in atmospheric turbulence

· Study the capabilities of the new MFIX-Trilinos framework
· Ran up to 160+ Fluidized Bed Multiphase Flow cases with different parameters through MFIX

· Learned how to use supercomputers through TACC and use Paraview to post-process the results

· Calculate Rankine cycle efficiencies by hand using different working fluids for CPS configurations
· Refer to Solar II Project to verify my mathematics and analyze the benefits of a certain fluids
· Apply the formula of the principle of conservation of energy to obtain the power outcome

· Learned effects of porous media, such as fingering, viscous effects, and capillary quantities
· Run more than 80 cases using the exa-scale pore network simulator to capture metal saturation times
· Worked under a Linux platform in which I ran all the cases and saved them in different directories

· Apply imaging techniques with ImageJ to see the oil trap in minerals, shales, etc
· Use statistical techniques to estimate the amount of oil trapped in geological formations
· Learned to detect different materials using non-destructive thermal imaging techniques

· Assisted with the generation of meshes to model different configurations of volumetric solar receiver
· Conceptualized the design of a volumetric solar receiver device powered by supercritical carbon dioxide
· Test multiple design iterations to measure variations/uncertainty in a volumetric solar receiver
Mentors: Drs. Vinod Kumar, V M Krushnarao Kotteda, and Christopher Harris

Multi-phase Modeling & Design of Mesoscopic Systems Group Aug 2023 - Dec 2023
Graduate Research

· High-Performance Computing Server Manager
· Implemented Finite Difference Explicit and Implicit Solvers to solve PDEs
· Learned Large Language Model - Transformer to be applied for Data-Driven Scientific Discovery
Mentor: Dr. Zhengtao Gan

Munoz Research Group Aug 2018 - Nov 2020
Undergraduate Research

· Study discriminative and generative algorithms found in deep learning
· Collaborate with another student in efforts to use an LSTM to predict turbulence
· Learned how to code a simple deep learning neural network using TensorFlow
Attended group presentations on these topics:
Material Science, Molecular Dynamics, Deep Learning, Data Science, and Astronomy
Mentor: Dr. Jorge A. Munoz

Applied Energy Research Group Aug 2018 - Dec 2018
Undergraduate Research

· Study surge and stall in a gas power cycle hybrid system
· Studied Piezoelectric/Pyroelectric materials to detect and prevent Surge and Stall
· Part of the literature review team, which involves looking relevant papers to prevent surge and stall
Mentor: Dr. Norman D. Love

Fiber Optics and Applied Communications Laboratory May 2016 - Dec 2016
Undergraduate Research

· Implemented Sense & Avoid Algorithms for Robotics Systems
· Reverse engineering an algorithm from a MathWorks EV3 to be implemented in an NXT
· Learned control theory and practical applications: feedback loops, state charts, PID, etc.
Mentors: Drs. Virgilio Gonzalez, and Pablo Rangel

Limbs International May 2015 - Aug 2015
Undergraduate Research

- Investigate the mechanical properties of carbon fiber polymers used in prosthetic devices
- Fatigue studies were performed to measure the life cycle of carbon fiber polymers
- Learned how to assemble prosthetic products

Mentor: Dr. Roger Gonzalez

SENIOR DESIGN PROJECT

X-Plane 10 Computational Fluid Dynamics (CFD) VTOL Plane Aerodynamics Validation
Undergraduate Senior Project

- Took physical measurements and modified existing CAD to re-create the VTOL physical geometry
- Established communication between X-Plane 10 and Mission Planner to operate flight missions
- Study blade element theory and adjust the X-Plane 10 simulator to validate my results

Mentor: Dr. Michael B. McGee

GRANTED PROPOSAL PROJECTS SUBMISSIONS

Predicting Boundary-Layer Transition (BLT) using Artificial Intelligence (AI) Causality Inference - $180,000 Tenure: Aug 2022 - Aug 2025

- Funded by National Science Foundation (NSF) Graduate Research Fellowship
- *PI: Arturo Rodriguez, Mentor: Dr. Vinod Kumar*

Background and Significance:
By understanding the transition from laminar to turbulent flow (BLT), we can design faster vehicles for defense and space applications than the state-of-the-art since they would not heat up as much, which is currently the main limitation in high-speed temperature conditions. BLT is a subject of fluid flow disturbances created by geometric parameters and flow conditions, such as surface roughness, increased velocity, and high-pressure fluctuations. These disturbances lead to the development of turbulent spots and differential heating. Historically, the Reynolds number has been used to predict whether a system will develop turbulent flow, but it has been known for decades that it is not always reliable and cannot predict the location where the BLT will occur: some experiments present scenarios where the flow is laminar at a high Reynolds number and vice versa. Several qualitatively and quantitatively types of instabilities exist, such as Rayleigh-Taylor (different density between fluids) and Kelvin-Helmholtz (different velocity between fluids). In this proposal, I introduce the idea of predicting BLT using causality artificial intelligence (AI) approaches introduced by AI pioneer and Turing Award winner Judea Pearl. This study will use cause and effect inference using temporal graphs like the ones shown in the figure to the left representing the same environment at different times and how the solution can be achieved by moving through different states as seen in Markov's theorem. And, when the conditions are different, but the environment is the same, the problem could be solved using different paths between states within graphs using Do-Calculus, which makes it a concrete theory since it can be used in different graphs within the same environment/problem type.

Azure Cloud Services for HPC - $30,000 Jan 2022 - May 2023

- Funded by Microsoft
- *PI: Arturo Rodriguez, Mentor: Dr. Vinod Kumar*

Purpose: Computational Fluid Dynamics and Artificial Intelligence.

Remote Sensing and Imaging Physics: Developing new metrics for deep turbulence effects on laser propagation through long path - $4,000 Aug 2018 - May 2019

- Funded by The University of Texas at El Paso (UTEP) COURI MERITUS Program
- *PI: Arturo Rodriguez, Mentors: Drs. Vinod Kumar, Jorge A. Munoz, and V M Krushnarao Kotteda*

Background and Significance:
Presence of strong turbulence in atmosphere along the laser propagation paths affects the quality of laser-based remote sensing and imaging and presents challenges to remote sensing technologies. To improve the quality of image detection and target selection in presence of the turbulence, there is a need for developing correlations new correlations to effectively characterize and compensate the images for turbulence effects. Adaptive optics (AO) theories have been successfully be used to develop correlations for weak turbulence effects but they fail to effectively characterize the imaging in deep turbulence scenario as also noticed in PI's preliminary work with Air Force Research Laboratories (AFRL). Our motivation is inspired by the hypothesis that theories developed for analyzing high Reynolds turbulent fluid dynamics problems will help us improve the optical turbulence characterization theories and develop new metrics for deep turbulence effects on long distance laser propagation.

HONORS AND AWARDS

AJKFED 2023 - Computational Fluid Dynamics Session Chair (Selected)

NSF GRFP Fellowship

DOE NNSA NGFP Fellowship

UTEP Mechanical Engineering Department Outstanding Performance Award

Houston Endowment Scholarship

Lockheed Martin Aeronautics UTEP Alumni Employees Endowed Scholarship in Eng

AFOSR/UTEP Research Assistantship

UTEP MERITUS Research Program Scholarship/Assistantship

Lockheed Martin Aeronautics Scholarship

Who's Who Among Students in American Universities & Colleges

The Boeing Company Scholarship

COMPUTER SOFTWARE

Python, TensorFlow, Keras, Pytorch, FEniCSx, FEniCS, SPARC, UNIX/Linux, MATLAB, ANSYS Fluent, Pointwise, Cubit, Sierra-Fuego, MFIX, SWAT, US3D, COYOTE, Albany, Dakota, Paraview, Tecplot, NX 10, ImageJ, R, LaTeX, Mathematica, C++, ANSYS Icepack, SABRE, LabVIEW, FORTRAN, SciANN, OpenFOAM, JAX, ANSYS Transient Thermal, ANSYS Steady-State Thermal and Simulink

COMMUNITY SERVICE

Information Session: *University of Texas at El Paso, UTEP*
Sept, 2023 - "U.S. DOE NNSA NGFP Information Session"

Session Speaker: *University of Texas at El Paso, UTEP*
April, 2023 - "Upward Bound/Upward Bound Math & Science Career Conference"

Invited Guest: *University of Texas at El Paso, UTEP*
May, 2022 - "Upward Bound Commencement"

Student Body Representative: *University of Texas at El Paso, UTEP*
Oct, 2021 - "U.S. Air Force Scientists coming to UTEP"

Invited Panel: *Campus Office of Undergraduate Research Initiatives, UTEP*
Jul, 2021 - "NSF GRFP Awardees"

Invited Panel: *Office of Student Fellowships and Awards, UTEP*
May, 2021 - "NSF GRFP Awardee"

Invited Panel: *University Honors Program, UTEP*
Nov, 2020 - "Alumni Spotlight"

Invited Talk: *The American Society of Mechanical Engineers, UTEP Chapter*
Jan, 2019 - "How is it to do research outside of UTEP"

Invited Talk: *The American Society of Mechanical Engineers, UTEP Chapter*
May, 2019 - "Research opportunities outside and inside UTEP"

YISD High Schools/Middle Schools Science Symposium Judge
Spring 2019 & Spring 2020

YHS Science Fair Judge
Fall 2019

Alumni inspiring rising High School Students, Upward Bound at UTEP Panelist
Summer 2017

TEACHING & ORGANIZER POSITIONS

Grande CARES DOE NNSA Consortium Jan 2023 - Present
Visitor Program Coordinator *UT El Paso*

· Helped the matching between students and scientists
Mentors: Dr. Vinod Kumar (UTEP) & Dr. Irina Tezaur (Sandia)

Advanced Modeling & Simulation Research Laboratory Jan 2021 - May 2023
Coordinator *UT El Paso*

· Lead and organize all involvement within the group
Mentor: Dr. Vinod Kumar (UTEP)

Advanced Modeling & Simulations (M&S) Seminar Jan 2021 - May 2023
Coordinator *UT El Paso*

· Coordinate STEM professionals to speak every Friday to Dr. Kumar's Research Group at UTEP
Mentor: Dr. Vinod Kumar (UTEP)

Mechanical Engineering Department Jan 2023 - May 2023
Teaching Assistant for Fluid Mechanics & Engineering Analysis II *UT El Paso*

· Give lectures to the students and helped them with their final project
Professor: Dr. Vinod Kumar (UTEP)

Prof. Clint Dawson (UT Austin) Visit to UTEP Nov 2022
Coordinator *UT El Paso*

· Helped coordinate the entire event (agenda, conference room reservations, etc.)
Mentor: Dr. Vinod Kumar (UTEP)

Explore STEM Camps May 2022 - Aug 2022
STEM Mentor *UT El Paso*

· Mentor three students on many STEM topics for the camps
Coordinators: Drs. Vinod Kumar, Beverley Argus-Calvo, and Vivek Tandon (UTEP)

U.S. Air Force Scientists Visiting UTEP Oct 2021
Coordinator *UT El Paso*

· Interacted with College of Engineering Staff on Coordinating Event
Professor: Dr. Vinod Kumar (UTEP)

Mechanical Engineering Department Jan 2021 - May 2021
Teaching Assistant for Advanced Mathematics *UT El Paso*

· Lectured on Physics-Informed Neural Networks (PINNs) and helped with class projects
Professor: Dr. Vinod Kumar (UTEP)

National Townhall Meeting on Advanced Modeling and Simulations Aug 2020 - Sept 2020
Coordinator *UT El Paso*

· Coordinated 26+ STEM professionals to speak at the afternoon sessions
Main Coordinator: Dr. Vinod Kumar (UTEP)

Explore STEM Camps May 2020 - Aug 2020
Speaker Organizer *UT El Paso*

· Coordinated 18+ STEM professionals to speak at the camps
Coordinators: Drs. Vinod Kumar, Beverley Argus-Calvo, and Neelam Agarwal (UTEP)

Mechanical Engineering Department Jan 2020 - May 2020
Teaching Assistant for Engineering Analysis II *UT El Paso*

· Provided Python coding support in classroom activities
Professor: Dr. Vinod Kumar (UTEP)

Explore STEM Camps Aug 2018
Engineering Instructor *UT El Paso*

· Taught Computational Fluid Dynamics (CFD) and Engineering Ethical Values
Coordinators: Drs. Vinod Kumar and Neelam Agarwal (UTEP)

Mechanical Engineering Department Aug 2017 - Dec 2017
Teaching Assistant for Thermal System Design *UT El Paso*

· Modeled a cooling system for a micro-controller using ANSYS Icepak
· Prepare and deliver a presentation for Thermal System Design students
Professor: Dr. Shaolin Mao (UTEP)

Department of Chemistry and Biochemistry Aug 2015 - Jan 2016
Teaching Assistant for CHEM 1305 *UT El Paso*

· Taught various chemistry subjects to 15 chemistry students for 2 hours every week
· Assisted Dr. Saupe Lab on collecting Hydrogen particles from H2O using UV Light and a catalyst
Coordinators: Drs. Geoffrey Saupe and James Becvar (UTEP)

Entering Student Program Aug 2015 - Jan 2016
Teaching Assistant for UNIV 1301 *UT El Paso*

· Helped 30+ students when they needed help with their assignments and graded 60+ papers every week
· Gave a presentation about research in an auditorium to 30+ students at the end of the semester
Coordinators: Dr. Oscar Perez and Ms. Claudia Vanessa Garcia (UTEP)

LEADERSHIP POSITIONS

Upward Bound Program Aug 2019 - March 2020
College Mentor *UT El Paso*

· Participated in student presentation discussions
· Shared my views on what college is like as an engineering student

Great Minds in STEM April 2019
College Captain for UTEP/U.S.Army Competition *UT El Paso*

· Communicated messages around different people, and help with anything to have a successful event
· Helped to keep the repair shop organized

American Society of Mechanical Engineers Aug 2018 - Dec 2018
Graduate Advisor *UT El Paso*

· Provide lists available of Scholarships, Internships, and/or Research Opportunities to members
· Established a Mentorship Program led by Upperclassmen

Researchain Aug 2017 - May 2018
Founder, Secretary, and Chair of Engineering *UT El Paso*

· Engaged engineering students in undergraduate research via group discussions and symposiums
· Presented on Career Day at Marian Manor Elementary School

IEEE Robotics and Automation Society June 2016 - Dec 2016
Founder & Research Coordinator *UT El Paso*

· Organize hack shops for students to learn about robotics
· Helped students learn about research

RESEARCH TRAVEL GRANTS

A.Rodriguez, Travel Support, APS March Meeting 2019, Physics Dept, UTEP $1200

A.Rodriguez, Travel Support, ASME FEDSM 2018 Meeting, Mechanical Engineering Dept, UTEP $300

SHORT-TERM STEM PROJECTS

Python Algorithm to Calculate Special Cases of Matrix Norms

RSCS 4033 Project, Mentor: Dr. Hamide Dogan-Dunlap

UNIVERSITY HONORS PROGRAM

Literature Review of Piezoelectric Sensor for Energy Applications

Honors Thermodynamics, Mentor: Dr. Norman Don Love

Investigation on the latest research in Mechanical Properties of Ultra-High-Temperature Ceramics

Honors Mechanics of Materials, Mentor: Dr. Omar Cedillos Barraza

Investigation on the latest research in Synthesis and Processing of Ultra-High-Temperature Ceramics

Honors Materials & Manufacturing Processes, Mentor: Dr. Omar Cedillos Barraza

Evaluating Commercial Software's through a glance at what is CFD Geometry

Honors Fluid Mechanics, Mentor: Dr. Shaolin Mao

Calculating the force to build an electromagnetic motor

Honors Dynamics, Mentor: Dr. Louis Everett

Applications of Integration in the field of engineering

Honors Calculus II, Mentor: Dr. Andrew Pownuk

Bernoulli's Principle

Honors UNIV Introduction to Engineering, Mentor: Dr. Michael Everett

Complex Numbers

Honors Calculus I, Mentor: Dr. Eduardo Quinonez

MENTORING

The University of Texas at El Paso (UTEP)
- **Fernando De Haro** / Dept of Aero/Mech Engineering, Undergraduate / Fall 2023
- **Nicholas Dudu** / Dept of Aero/Mech Engineering, Undergraduate / Spring 2020 - Summer 2023
- **Vicente Corral** / Dept of Physics, Undergraduate / Summer 2021 - Summer 2023
- **Abdiel Cruz** / Dept of Aero/Mech Engineering, Undergraduate / Fall 2021 - Summer 2023
- **Kate Reza** / Dept of Aero/Mech Engineering, Undergraduate / Spring 2022 - Summer 2023
- **Rene Reza** / Dept of Computer Science, Undergraduate / Spring 2022 - Summer 2023
- **Esperanza Moreno** / Dept of E-LEAD, Undergraduate / Fall 2022 - Summer 2023
- **Juan Herrera** / Dept of Aero/Mech Engineering, Undergraduate / Fall 2022 - Summer 2023
- **Thomas Del Palacio** / Dept of Aero/Mech Engineering, Undergraduate / Spring 2023
- **Ayush Garg** / Dublin High School / Summer 2023
- **Raul Baez** / Dept of Computer Science, Undergraduate / Fall 2023
- **Eric M. Alonzo** / Dept of Aero/Mech Engineering, Undergraduate / Fall 2023
- **Brandon Paez** / Dept of Mathematics, Undergraduate / Fall 2019 - Fall 2022
- **Julio Aguilar** / Dept of Aero/Mech Engineering, Undergraduate / Spring 2020 - Fall 2021
- **Gael Moran** / (Currently) Computer Science - Caltech, Undergraduate / Fall 2020 - Spring 2021
- **Cesar Meza** / (Currently) AeroAstro - MIT, Undergraduate / Spring 2020

ARXIV PRE-PRINTS

(1) V. Corral-Arreola, **A. Rodriguez**, V. Kumar. "Current State of Atmospheric Turbulence Cascades". *arXiv preprint arXiv:2412.19953*.

(2) J.C. Herrera, L.L. Sandoval, P. Kumar, S.S. Kumar, **A. Rodriguez**, V. Kumar, A. Bronson. "Computational Analysis of the Temperature Profile Developed for a Hot Zone of 2500 °C in an Induction Furnace". *arXiv preprint arXiv:2412.10547*.

(3) **A. Rodriguez**, A. Chattopadhyay, P. Kumar, L.F. Rodriguez, V. Kumar. "Partition of Unity Physics-Informed Neural Networks (POU-PINNs): An Unsupervised Framework for Physics-Informed Domain Decomposition and Mixtures of Experts". *arXiv preprint arXiv:2412.06842.*

(4) J.A. Terrazas, P. Kumar, **A. Rodriguez**, L.F. Rodriguez, R.O. Adansi, V. Kumar. "Designing an Optimal Scoop for Holloman High-Speed Test Track Water Braking Mechanism using Computational Fluid Dynamics". *arXiv preprint arXiv:2411.18939.*

(5) **A. Rodriguez**, P. Kumar, C. Diaz-Caraveo, R.O. Adansi, L.F. Rodriguez, V. Kumar. "Computational Investigation of Roughness Effects on Boundary-Layer Transition for Stetson's Blunt Cone at Mach 6". *arXiv preprint arXiv:2410.00228.*

(6) E. Moreno, P. Kumar, R.O. Adansi, D. Moreno, D. Rodriguez, R.Baez-Ramirez, A.R. Kapsa, **A. Rodriguez**, N. Agarwal, V. Kumar, B.A. Calvo, V. Tandon. "Empowering Abilities: Increasing Represetnation of Students with Disabilities in the STEM Field". *arXiv preprint arXiv:2409.12251.*

PEER-REVIEWED JOURNAL ARTICLE PUBLICATIONS

(1) C. Diaz-Caraveo, K. Wolk, S. Miesner, M. Montemayor, **A. Rodriguez**, V. Kumar, J.A. Munoz, T. Daimaru, B. Furst, S.N. Roberts. "Performance-Dryout Limits of Oscillating Heat Pipes: A Comprehensive Theoretical and Experimental Determination". *Journal of Thermophysics and Heat Transfer.*

(2) V.M. Kotteda, A. Schiaffino, A. Chattopadhyay, S. Shantha-Kumar, V. Kumar, A. Bronson, **A. Rodriguez**. "Sensitivity of Viscosity on Molten Ti Infusion into a B4C-Packed Bed at the Microscale". *Metallurgical and Materials Transactions B.*

PEER-REVIEWED CONFERENCE PROCEEDINGS

(1) J.C. Herrera, L. Sandoval, P. Kumar, S.S. Kumar, **A. Rodriguez**, V. Kumar, A. Bronson. "Computational Analysis of the Temperature Profile Developed for a Hot Zone of 2500 °C in an Induction Furnace". *ASME 2024 Fluids Engineering Division Summer Meeting, July 15, 2024.*

(2) E. Moreno, P. Kumar, R.O. Adansi, **A. Rodriguez**, V. Kumar. "Exploring Capillary Flow in Paper-Based Microfluidics: Unraveling Mechanics and Applications". *ASME 2024 Fluids Engineering Division Summer Meeting, July 15, 2024.*

(3) P. Kumar, **A. Rodriguez**, R.O. Adansi, V. Kumar, E. Moreno, E.M. Alonzo. "Surface Roughness Effects on the Hypersonic Flow Over Double-Wedge Bodies with a Blunt Leading Edge at Different Aft-Wedge Angles". *ASME 2024 Fluids Engineering Division Summer Meeting, July 15, 2024.*

(4) R.O. Adansi, **A. Rodriguez**, P. Kumar, V. Kumar. "Analysis of Strong Turbulence Effects on Laser and Speckle Propagation". *ASME 2024 Fluids Engineering Division Summer Meeting, July 15, 2024.*

(5) C. Diaz-Caraveo, K. Wolk, S. Miesner, **A. Rodriguez**, M. Montemayor, V. Kumar, J.A. Munoz, B. Furst, T. Daimaru, S.N. Roberts. "Performance dryout limits of oscillating heat pipes: a comprehensive theoretical prediction and experimental determination". *AIAA SCITECH 2024 Forum.*

(6) D. Villanueva, B. Paez, **A. Rodriguez**, A. Chattopadhyay, V M Krushnarao Kotteda, R. Baez, J. Perez, J. Terrazas, V. Kumar. "Field predictions of Hypersonic Cones using Physics-Informed Neural Networks". *ASME 2022 Fluids Engineering Division Summer Meeting, August 1 - 3, 2022.*

(7) J. Perez, R. Baez, J. Terrazas, **A. Rodriguez**, D. Villanueva, B. Paez, A. Cruz, O. Fuentes, V. Kumar. "Physics-Informed Long-Short Term Memory Neural Network Performance on Holloman High-Speed Test Track Sled Study". *ASME 2022 Fluids Engineering Division Summer Meeting, August 1 - 3, 2022.*

(8) **A. Rodriguez**, V.S. Rao Gudimetla, R. Adansi, J. Terrazas, V. Corral, R. Baez, B. Paez, C. Harris, V. Kumar. "Atmospheric Turbulence Intermittency effects on Remote Sensing Laser Propagation". *ASME 2022 Fluids Engineering Division Summer Meeting, August 1 - 3, 2022, Online, Virtual Conference.*

(9) A. Cruz, **A. Rodriguez**, V M Krushnarao Kotteda, B. Paez, D. Villanueva, C. Chijioke, J. Terrazas, V. Kumar. "Aerodynamic Performance of Symmetric and Cambered Airfoils at Low Reynolds Numbers". *ASME 2022 Fluids Engineering Division Summer Meeting, August 1 - 3, 2022, Online, Virtual Conference.*

(10) D. Rodriguez, L. Trevizo, **A. Rodriguez**, J. Aguilar, C. Chijioke, B. Paez, R. Baez, V M Krushnarao Kotteda, V. Kumar. "Learning and Engaging Through Transformative Informal Setting Driven by COVID Induced Leading Edge Virtual Technology for Advanced Fluid Mechanics Modeling and Simulations Seminar Series". *ASME 2022 Fluids Engineering Division Summer Meeting, August 1 - 3, 2022, Online, Virtual Conference.*

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