

# Siva Viknesh

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Passionate about building **Hybrid Physics–AI frameworks** that combine computational solvers and data-driven methods to solve complex spatio-temporal engineering flow problems.

## EDUCATION

<b>Ph.D. in Mechanical Engineering</b> , <b>The University of Utah</b> , Utah, USA <i>Towards Interpretable &amp; Differentiable Machine Learning for Fluid Flows</i> Advisor: <b>Dr. Amir Arzani</b>	Aug 2022 – May 2026 CPI : 3.89/4
<b>M.S. in Aerospace Engineering</b> , <b>Indian Institute of Technology Kanpur</b> , India <i>Control of separated flow on a Symmetric Airfoil by Pitching Oscillation</i> Advisor: <b>Dr. Kamal Poddar &amp; Dr. Tapan K. Sengupta</b>	Jan 2018 – May 2020 CPI : 8.33/10
<b>B.E. in Aeronautical Engineering</b> , <b>Anna University</b> , Tamilnadu, India <i>Numerical Simulation of Fluid Flow over a Rectangular Wing - Wingtip Slots</i> Advisor: <b>Dr. Shanmugaraja M</b>	Aug 2012 – May 2016 CPI : 8.30/10

## WORK EXPERIENCE

<b>Graduate Student</b> , <b>Los Alamos National Laboratory</b> , New Mexico, USA <b>Statistical Shape Modeling</b> , ML-pipeline of DEM terrains for Wildfires containment.	May 2025 – Present
<b>Graduate Research Assistant</b> , <b>SCI Institute</b> , <b>University of Utah</b> , Utah, USA <b>Differentiable Autoencoding Neural Operator</b> , integrating Operator learning with Differentiable PDE solvers. <b>GPU-accelerated 2D Wildfire Transport PDE solver</b> , leveraging CUDA and Finite Difference Method. <b>ADAM-SINDy</b> , a differentiable optimization framework for Nonlinear Dynamical System Identification.	Aug 2022 – Present
<b>Aerodynamics Engineer</b> , <b>The ePlane Company</b> , <b>IIT Madras</b> , Chennai, India <b>FVM solver template</b> for 3D CFD URANS simulations, reducing the validation error of $\sim 30\%$ . <b>Custom UDF programs</b> to generate unsteady boundary conditions for <b>dynamic stability derivatives</b> calculations.	Sep 2021 – Aug 2022
<b>Senior Research Associate</b> , Aerospace Engineering Dept., <b>IIT Kanpur</b> , India Simultaneous Time-resolved PIV and Pressure Measurements on Pitching Airfoils. Mentored master's and undergraduate students in their thesis research involving experimental measurements.	Jan 2021 – Aug 2021
<b>Associate – Content Development</b> , <b>BYJU'S</b> , Bengaluru, India Developed Mathematics content for the high school syllabus.	Aug 2020 – Jan 2021
<b>Student Research Associate</b> , Aerospace Engineering Dept., <b>IIT Kanpur</b> , India Implemented <b>2D - Orthogonal grid generation</b> in Fortran. Developed a <b>2D DNS/LES compressible PDE solver</b> using MPI-Fortran. Performed <b>Unsteady Pressure</b> , <b>Hot-wire</b> , and <b>Time-resolved PIV</b> measurements on oscillating wings.	Jan 2018 – Jul 2020
<b>CFD Engineer</b> , <b>FlowXplore - CAE Associates</b> , <b>Coimbatore</b> , India <b>RANS simulations</b> of Wind Turbines using the MRF technique.	May 2016 – Nov 2017

## TECHNICAL SKILLS

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|-----------|---------------|-------------------|
| • PyTorch | • MPI Fortran | • GPU/CPU solvers |
| • CuPy    | • NI LabVIEW  | • MATLAB          |

## JOURNAL PUBLICATIONS

- **Differentiable Autoencoding Neural Operator for Interpretable and Integrable Latent Space Modeling**, S. Viknesh, A. Arzani, Submitted, 2025.
- **Data-Driven System Identification in Cancer Systems Biology: A Multiscale Modeling Approach to Melanoma**, C. Christenson, S. Viknesh, R. Judson-Torres, A. Arzani, Submitted, 2025.
- **ADAM-SINDy: An Efficient Optimization Framework for Parameterized Nonlinear Dynamical System Identification**, S. Viknesh, Y. Tatari, C. Christenson, A. Arzani, Submitted, 2025.
- **Role of flow topology in wind-driven wildfire propagation**, S. Viknesh, A. Tohidi, F. Afghah, R. Stoll, A. Arzani, *Physics of Fluids*, May 2025.
- **Active control of separated flow on a symmetric airfoil by pitching oscillation**, S. Viknesh, K. Poddar, *Physics of Fluids*, August 2021.
- **Grid sensitivity and role of error in computing a lid-driven cavity problem**, V. K. Suman, S. Viknesh, M. K. Tekriwal, S. Bhaumik, T. K. Sengupta, *Phys. Rev. E*, Jan 2019.

## ACTIVITIES & ACHIEVEMENTS

- Reviewed research papers for the **Physics of Fluids** journal.
- **President & Admin**, Tamil Club at IIT Kanpur (Jan 2019 – Sep 2021).
- Awarded a **Full Scholarship** for pursuing the M.S. program at IIT Kanpur.
- Achieved All India Rank **141 & 540** in GATE AE 2017 and 2016.
- Inter-department **Chess Champion & Badminton Runner** – 2013-2015.