



ADITYA PHOPALE

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Karl-Köglsperger-Strasse 3 // 0110, 80939 Munich

CAREER OBJECTIVE

I aim to merge data-driven modeling with traditional numerical approaches to better understand and predict complex fluid flow dynamics. Through the application of machine learning techniques, I seek to develop models that can accelerate simulations and enhance accuracy compared to current state-of-the-art methods.

EDUCATION

Technical University of Munich

October 2021 - September 2024

M.Sc. (Hons.), in Computational Science and Engineering,
Bavarian Graduate School of Computational Engineering

Overall Grade: 1.5/1

Relevant courses: Scientific Computing, Numerical Programming, Parallel Programming, Lattice Boltzmann method, Turbulent Flow Simulation on HPC Systems, CFD Lab

[Transcripts](#)

Birla Institute of Technology and Science, Goa

August 2017 - May 2021

Department of Mechanical Engineering

Overall Grade: 9.16/10

EXPERIENCE

University of Notre Dame

Sept 2024 - Present

Research Assistant

- Developing a neural differentiable solver for the Pulsed electrochemical machining process.
- Using neural network to predict the solution of Laplace's equation for immersed boundary methods problems.

Siemens Digital Industries Software

May 2023 - April 2024

Working Student

- Conducted research in scientific machine learning as part of my Master's thesis.
- Employed sampled neural networks with domain decomposition to solve partial differential equations.

Numeric Systems GmbH

Oct 2022 - April 2023

Working Student

- Executed benchmark CFD cases on Pacefish software.
- Validated results from the software with the wind tunnel experiments.

TECHNICAL SKILLS

Programming Language

C++, Python, Julia, MATLAB

DL frameworks

Pytorch

Version Control

Git

Parallel standards

OpenMP, MPI

Analysis

Tecplot, Paraview

PROJECTS

Using neural networks with domain decomposition to solve partial differential equations (Masters Thesis @TUM & Siemens) [Thesis presentation](#) and [Thesis report](#)

- Implemented a method known as ELM to solve partial differential equations using a randomized neural network.
- Focused on improving solution accuracy in my thesis by employing better initialization techniques for neural networks, specifically utilizing the Sampling Where It Matters (SWIM) method and domain decomposition.
- Acquired valuable experience through collaboration on a research problem with industry.

Domain decomposition to accelerate learning of Physics Informed Neural Network (PINN) (Seminar course @TUM) [Seminar paper](#)

- Replicated a paper implementing Finite Basis Physics-Informed Neural Network (FBPINN). [link](#)
- Implemented overlapping subdomains to solve partial differential equations using Physics-Informed Neural Networks.
- Computed the final solution through additive schwarz domain decomposition.

Improve Building Efficiency for a Better Future (BGCE @TUM & Siemens) [Gitlab](#)

- Collaborated with a team to develop an application to enhance building energy efficiency.
- Created a building's thermal model and heating control based on user-provided floor plans.
- Contributed to this project as part of the honors program at BGCE, supervised by Siemens.

Simulating Free Surface Flows using Marker and Cell method (CFD Lab @TUM) [Github](#)

- Developed an object-oriented 2D parallel CFD solver in C++ for solving incompressible Navier-Stokes equations using Finite Difference Method (FDM).
- Extended the solver to support free surface flows utilizing the Marker and Cell Method, successfully simulating dam break and tank sloshing scenarios.

Using Entropically Damped Artificial Compressibility to simulate Rayleigh-Benard Convection (Undergraduate Thesis @BITS) [Thesis report](#)

- Utilized the EDAC technique to obtain solutions for the Navier-Stokes equation, bypassing the pressure Poisson equation by implementing a pressure-evolving equation.
- Extended the existing Fortran codebase for the Rayleigh-Bénard Convection Problem, adding new functionalities and improving performance.

ONLINE COURSES AND CERTIFICATES

Simulation and Modelling of natural processes; Neural Networks and Deep Learning; Improving Deep Neural Networks; Statistical Thermodynamics; Computers, Waves, Simulations

HONOURS AND AWARDS

Bavarian Graduate School of Computational Engineering

Selected for the honours program of Masters in Computational Science and Engineering at the Technical University of Munich. (<https://www.bgce.de/>)