

# Nilotpal Chakraborty

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## EDUCATION

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### Virginia Polytechnique Institute and State University

*Phd in Engineering Mechanics*

Blacksburg, Virginia

*Jan 2022 – Present*

### NIT Tiruchirappalli

*BS in Mechanical Engineering*

Tiruchirappalli, Tamil Nadu

*July 2016 – June 2020*

## PROFESSIONAL EXPERIENCE

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### Contributor to SPHinXsys

*Virginia Tech / Technical University Munich*

April 2023 – Present

*Remote*

- Working with TUM researchers on developing an open source SPH software
- Collaborating with developers through GitHub
- Developing a 3D SPH code that can simulate high speed droplet impact
- Using OOP for class design and Intel tbb for parallelization while coding

### Researcher

*Virginia Tech / Rolls-Royce University Technology Center*

April 2022 – Dec 2022

*Blacksburg, Virginia*

- Worked with a team of Rolls-Royce engineers, Virginia Tech professors and Phd students
- Developed novel stochastic particle fracture models for high speed aero-engine compressors
- Developed MATLAB codes for particle fracture models
- Used git for version control
- Wrote a technical report using Latex for Rolls-Royce summarizing the models

### Software Developer

*Zeus Numerix Pvt. Ltd*

Nov 2020 – April 2021

*Pune, Maharashtra*

- Contributed to development of a software that simulates the physics of chaotic atmospheric turbulence
- Wrote code for two modules out of total six modules of the software
- Developed models for the extinction coefficient and optical turbulence phenomena in the atmosphere
- Used OOP for class design
- Got experienced in unit testing in C++
- Collaborated with developers through GitLab

### Graduate Research Intern

*IIT Madras*

May 2020 – Aug 2020

*Chennai, Tamil Nadu*

- Contributed to the development of FEST-3D, an open source CFD software
- Coded in Fortran
- Got experienced in using Paraview for visualization

## PUBLICATIONS

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1. M. M. Akash, N. Chakraborty, J. Mohammad, K. Reindl, and S. Basu. Computational multiphase characterization of perfusion trends inside biomimetic reduced-order dense tumors. *Experimental and Computational Multiphase Flow*, 2022

## ACADEMIC PROJECTS

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### Prediction of Membrane Permeability of Molecules Using Machine Learning

Aug – Nov 2022

- Worked with a group of 4 PhD students from different departments
- Data engineering: Responsible for visualization, analysis and preprocessing of raw datasets of approx. 100k rows and 300 columns
- Developed Python codes for k-means clustering, Lasso and MLP based ML models
- Used Python scientific computing modules Numpy, Scipy and Matplotlib
- Got familiar with the Cheminformatics package
- Wrote a technical report in Latex disseminating the findings

## 2D Navier Stokes solver for lid driven cavity flow

Spring 2022

- Wrote a MATLAB code for simulating the 2d lid-driven cavity problem using FVM
- Implemented staggered grid algorithm
- Validated results for Reynolds nos. 10-1000 with Ghia and Ghia

## Blood flow into pancreatic tumors

Aug 2020 – Dec 2021

- Worked with researchers from National Institutes of Health and South Dakota State University
- Developed a reduced order model for three phase non-Newtonian blood flow into a human pancreatic tumor
- Wrote user-defined functions in ANSYS Fluent to perform multiple simulations with varying design and boundary/initial conditions
- Disseminated research work at APS DFD 2021 conference
- Published a paper in *Experimental and Computational Multiphase Flow*

## 2D Navier Stokes solver for a pressure driven Hagen Poiseuille flow

Aug – Nov 2019

- Developed a solver in Python for solving 2d Navier Stokes equations for flow inside a pipe
- Used Python scientific computing modules Numpy, Scipy and Matplotlib

## von Karman Turbine

Aug 2018 – May 2019

- Worked with a team of 6 people as the project lead
- Modelled flow and wake induced vibrations using a Van der Pol equation, a second order non-linear ODE with non-linear damping in MATLAB
- Used time integration methods such as semi-implicit Euler and Runge-Kutta Fehlberg schemes, and techniques of numerical continuation and shooting
- Designed and built a turbine power-station to undergo 1D vibration by eliminating drag effects
- Presented the project to industry professionals during NIT Trichy's techfest and won the first prize

## RELEVANT COURSES TAKEN

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**Programming assignments:** OOP in Java, Machine Learning, CFD and Heat Transfer, Numerical Analysis and Software

**Mechanics specialization:** Continuum mechanics, Fluid Mechanics, Solid Mechanics, Dynamics

## TECHNICAL SKILLS

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**Languages:** C, C++, Java, Python, Matlab, Fortran

**Softwares:** Latex, ANSYS Fluent, Paraview, Mayavi, Microsoft Office

**Operating Systems:** Linux(Ubuntu), Windows

## SOFT SKILLS

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**Communication:** Excellent English speaking and writing skills

**People management:** As the President of a technical club at my undergraduate university, I had first hand experience of talent identification, team building and conflict resolution