Sanath Kottursheettar

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M. Sc. Mechanical Engineering, TU Delft.
Computational Fluid Dynamics

About Me

I am an *M. Sc. Mechanical Engineering* student specializing in Energy, Process, and Flow Technology, with a strong passion for understanding and formulating effective solutions to problems involving *heat transfer* and *turbulence* in complex flow systems using *computational fluid dynamics* (CFD). As a dedicated CFD enthusiast, I am seeking *full-time opportunities* where I can leverage my expertise in this area to make meaningful contributions and provide a fresh perspective on current challenges.

Keywords: Computational Fluid Dynamics, Turbulence, Direct Numerical Simulations, Heat Transfer, Programming, Python, Fortran, High-Performance Computing, Research, Logical Reasoning, Problem Solving.

Education

M.Sc., Mechanical Engineering *(Energy, Process and Flow Technology)* — Aug 2021 - Jun 2023
TU Delft — Delft, The Netherlands

Relevant Coursework:

Advanced Fluid Dynamics | Turbulence | Advanced Heat Transfer | Multiphase Flows | Viscous Flows | Numerical Analysis | Modeling of Thermodynamic Systems | Turbomachinery | Equipment for Heat and Mass Transfer

- *Thesis*: Stratified Turbulent Flows *(CFD)*
  - Developing an approach to capture the turbulence and heat transfer characteristics in the presence of non-Oberbeck Boussinesq effects using direct numerical simulation (DNS) of stably stratified wall-bounded turbulent flows.
  - Implemented the zero-Mach limit approximation of Navier-Stokes equations, to account for inertial effects.
  - Demonstrating expertise in Fortran and parallel programming, and utilizing supercomputer resources to achieve high-performance simulations.

Bachelor of Technology, Mechanical Engineering, CGPA: 9.15 — Aug 2016 - Jul 2020
National Institute of Technology Karnataka, Surathkal — Karnataka, India

- *Academic Performance*- Top 5% of class.
- *Thesis*: Modelling of Blood Flow in Artery *(CFD)*
  - Flow in a 2-d channel is modeled using SIMPLE algorithm. The walls were modeled as elastic membranes using the Immersed Boundary Method (IBM).
  - The IBM was validated by simulating the deformation patterns of an elastic capsule in 2-d channel flow.
  - The blood flow couldn't be modeled due to lack of accessibility to resources owing to Covid restrictions.

Technical Skills

Programming: Fortran, C, C++, Python, Matlab.

Application Softwares: ANSYS Fluent, CATIA, ABAQUS, COMSOL Multiphysics.

Internships

Creating Spanwise Cuts on Turbomachinery Geometry | **Research Intern** — Jul 2022 - Oct 2022
Tecplot, Inc. — Regenstauf, Germany

- Pioneered the development of an algorithm in Python that enables the production of precise cuts, such as pitchwise, spanwise, or meridional, in the computational volume for turbomachinery applications.
- Innovatively defined a new coordinate system based on pitchwise, spanwise, and meridional coordinates, which is independent of mesh topologies and suitable for multi-stage designs.

Transient Model Improvement for Large Diesel Engines | **Project Intern** — May 2019 - Jul 2019
Caterpillar, India, R&D, Large Power Systems Division. — Bangalore, India

- Successfully identified the root causes of energy loss in a turbocharger.
- Expertly conducted a comprehensive analysis of turbo-lag to identify and evaluate various contributing factors, including the impact of thrust and journal-bearing friction on boost build-up.

Relevant Course Projects

Numerical Analysis of PDEs — Sep 2021 - Jan 2022
TU Delft — Delft, The Netherlands

- Developed a numerical solution for 1D and 2D Poisson's Equation using the Finite Difference Method.
- Utilized the Finite Element Method to model atmospheric pollution, highlighting expertise in numerical simulations.
- Successfully programmed a numerical solution to a non-linear coupled reaction-diffusion problem, showcasing advanced computational skills.
- Demonstrated proficiency in Python by performing all simulations using the programming language, which allowed for complex problem-solving and a deeper understanding of numerical methods.

Turbomachinery — Nov 2021 - Jan 2022
TU Delft — Delft, The Netherlands

- Analyzed the performance of the Intercooled and Recuperated Brayton Cycle, and compared it with the Basic Brayton Cycle. Calculated specific work, thermal efficiency, and sensitivity to compressor efficiency using Python, demonstrating a strong command of thermodynamics and programming.
- In another assignment, we designed a 3D compressor stage. The loading factor, degree of reaction and blade angle were calculated for a given blade speed.
- We studied the combustion characteristics of gaseous hydrogen, natural gas and a blend of the two as fuels. Also investigated the possibility of flashback. In addition, studied the influence of increasing hydrogen content in fuel.

Design of Heat Exchangers | **Shell and Tube, Plate and Air HX** — Mar 2022
TU Delft — Delft, The Netherlands

- Shell and Tube HX was designed for an OTEC power plant with a very high mass flow rate of water.
- Plate HX and Air HX were also modeled for industrial-scale applications using Python.
- The design was optimized for a given duty, with constraints of pressure drop. A cost analysis was carried out.

Linear Modeling — Nov 2021
TU Delft — Delft, The Netherlands

- FEM solver was programmed for bar, truss and beam elements using Python.
- The results were validated by simulating the same on ABAQUS.
- I was new to the domain and had to learn and adapt quickly. Enhanced my ability to understand and grasp new things and also apply them.

Additional Projects

Mechanical Simulation Of 3-axis Accelerometers using Single Proof-mass. 2019-2020

- A 3-axis, single proof-mass, comb-drive accelermeter was modeled and simulated using COMSOL. Accelerations in all the 3 directions with a single device could be captured without compromising sensitivity(deflection/acceleration) in any direction.

Electro-Magnetic Desalination 2018-2019

- In this project a theoretical model is developed for electromagnetic-mechanical salt removal process and solved numerically to investigate the optimum parameters for separation. [*COMSOL*]

Study of the Influence of Inner Lining Material on Stratification 2017-2018

- Design was modeled using CATIA and analysis was carried out using ANSYS fluent. Results showed the formation of uniform temperature layers leading to the formation of stable thermocline which helps in efficient thermal energy storage.

Amateur Interests

Story Telling | Reading Fiction | Poetry Writing | Standup Comedy | Playing Badminton | Football |

Blog: https://joyfulfootlights.wordpress.com/