Sanath Kottursheettar

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

About Me

I am a *M. Sc. Mechanical Engineering* student specializing in Energy, Process, and Flow Technology and seeking *full-time opportunities* wherein I can contribute through my experience, knowledge, and a fresh perspective on the current challenges. I am passionate about understanding and formulating effective solutions to problems involving *heat transfer* and *turbulence* in complex flow systems using *computational fluid dynamics*.

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

Education

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

Relevant Coursework:

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

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

- *Academic Performance- Top 5% of class*

Technical Skills

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

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

Relevant Technical Experience

❑ **Stratified Turbulent Flows (*CFD*) | M. Sc. Thesis** — Oct 2022 - Ongoing
TU Delft | Supervisors: Prof.Rene Pecnik & Dr.Pedro Costa | — Delft, The Netherlands

- DNS of stably stratified wall-bounded turbulent flows with strong variations in thermophysical properties.
- Implemented the zero-Mach limit approximation of Navier-Stokes equations so as to account for density variations.
- Aim is to capture the turbulence and heat transfer characteristics in presence of non-Oberbeck Boussinesq effects.
- Developed proficiency in Fortran, parallel programming, and also acclimatized with using the supercomputer.

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

- Algorithm that could be used to produce specific cuts (pitchwise, streamwise or meridional) in the computational volume for turbomachinery applications was developed using Python.
- New coordinate system defined by pitchwise, streamwise and meridional coordinates is independent of mesh topologies and can be used for multi-stage designs as well.

❑ **Modelling of Blood Flow in Artery (*CFD*) | B. Tech. Thesis** — Aug 2019 - March 2020
National Institute of Technology Karnataka, Surathkal — Karnataka, India

- 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.

Relevant Course Projects

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

- Programmed numerical solution for 1D and 2D Poisson's Equation using Finite Difference Method.
- Modelled atmospheric pollution using Finite Element Method.
- Programmed Numerical Solution to non-linear coupled reaction-diffusion problem.
- All simulations carried out on Python. This enhanced complex problem solving skills.

❑ **Turbomachinery** Nov 2021 - Jan 2022
TU Delft Delft, The Netherlands

- Basic Brayton cycle was compared with the Intercooled and Recuperated Brayton Cycle. Specific work, thermal efficiency and sensitivity to compressor efficiency were analyzed using Python.
- 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.

Technical Experience

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

- Aim of the project was to identify the causes for energy loss and quantify in a way it can be modeled.
- Various causes for turbo-lag were identified. Impact of thrust and journal bearing friction on boost build-up was studied in detail.

Additional Course Projects

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

- Course: Equipment for Heat Transfer. [*Modelled using Python*]
- 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 designed for industrial-scale applications.
- The design was optimized for a given duty, with constraints of pressure drop. A cost Analysis was carried out.

❑ **Linear Modeling** Sep 2021 - 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.

❑ **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 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/