THAMILMANI MURUGAN

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SUMMARY

Passionate CFD researcher on applications of turbulence, heat transfer, energy, aerodynamics, turbomachinery. Currently pursuing PhD on supercritical heat transfer modelling at IIT Bombay and I constantly dabble with problems that are challenging and exciting to solve.

WORK EXPERIENCE

Consultant, Tabrej DesignLife Inc., **Dec 2022 – Feb 2023**

- Conducted a feasibility study and thermo-dynamic system analysis.

Project Officer, COPT, IIT Madras **July – Dec 2018**

- Involved in a DRDO project under Prof. BVSSS Prasad (Late) on computational analysis to assess the effect of tip vortices on gas turbine blade cooling.

EDUCATION

PhD., Mechanical Engineering, **Jan 2019 - Present**

Indian Institute of Technology Bombay, Mumbai

- Thesis on "Analysis of flow transitions, heat transfer characteristics in supercritical heat transfer"
- Developed a novel turbulent Prandtl number model for predicting heat transfer deterioration at supercritical fluids.
- Managed and maintained HPC Cluster in the lab.

M.Tech, Thermal and Fluids Engineering, **Aug 2016 – June 2018**

Amrita University, Kollam, Kerala

- Thesis on "Numerical analysis of aerodynamics of multiple bluff bodies in tandem arrangement"
- Gold medallist with 9.48 CGPA
- Project Intern for six months at IIT Bombay PIV Lab under Prof. Amit Agrawal for my dissertation.

KEY SKILLS

Programming Languages: Python, C, C++, MATLAB, BASH,

Software/Tools: Ansys Fluent, CFX, ICEM, OpenFOAM, SolidWorks, ROCKS Cluster

Technical Skills: CFD, Turbulence modelling, Workflow automation, HPC Management

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PUBLICATIONS & CONFERENCES

Journal Articles:

1. Murugan *et al.*, "Proposal of turbulent Prandtl number models for predicting heat transfer deterioration in supercritical flows", *Physics of Fluids*, (accepted in August 2025)
2. Murugan *et al.*, "Study on Convective Heat Transfer of Supercritical Water in Annular Square Channel", *Heat Transfer Engineering*, Jan 2023.
3. Narasimhan *et al.*, "Studies on the inward spherical solidification of a phase change material dispersed with macro particles", *Journal of Energy Storage*, vol. 15, pp. 158-171, Feb, 2018.

Conference Presentations:

1. "Characterization of Helmholtz oscillator for mitigating heat transfer deterioration in supercritical flows", ECOS 2025, Ecole des Mines, PSL, Paris, France, June 29 – July 4, 2025.
2. "Numerical studies on flow over multiple cylinders in tandem arrangement: Effect of number of cylinders", FMFP 2018, IIT Bombay, Mumbai, India, Dec 2018

OTHER WORKS

Teaching Assistance:

Courses on Computational Fluid Dynamics and Heat Transfer, Air-conditioning system design, Heat transfer, Advanced Thermodynamics, etc. at IIT Bombay, Mumbai from 2019 – 2024.

Side Projects:

1. Built Python based CLI Tools to automate and integrate CFD Workflows:
   a. ***foam_to_fluent2D*** (Convert 2.5D OpenFOAM generated meshes to 2D ANSYS Fluent Meshes),
   b. ***residual_HPC*** (Generates residual monitor in real time for ANSYS Fluent cases running in a HPC),
   c. ***postprocess_CLI*** (Integrated batch postprocessing utility for ANSYS Fluent results to generate report)
   d. ***supercritical_CLI*** (full-fledged automated tool from model, meshing, analysis, postprocessing to report generation)
2. Freelance Consulting different CFD projects for others under **Thedal Flow Code**
