Ramesh M *Propulsion Engineer*

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PROFILE

Propulsion and fluids engineer with an MTech in Thermal and Propulsion, combining **CFD, conjugate heat transfer and hardware qualification**. At Agnikul, built an **OpenFOAM regenerative-cooling CHT workflow**, analysed manifold flow and pressure loss, and compared predictions with firing measurements. Took check valves from P&ID requirements through **functional, leak, thermal and vibration tests to flight qualification**. At Praan, use **ANSYS Fluent, OpenFOAM and Python** for airflow CFD, automated studies and CADR rig-data comparisons. MTech research covered methane-air reacting-flow CFD.

EXPERIENCE

CFD Engineer 08/2026 – Present
Praan Inc.
• Analyse airflow CFD for air-purification hardware; traced a **16× inlet-area error** and checked corrected cases using **2 inlet formulations**.
• Review solver settings and automate runs within a team workflow benchmarked at **3.7 to 1.7 hours per case**, with airflow within 1% across 6 benchmark cases.
• Develop **Python automation** for CFD case preparation, simulation runs and result processing, using parametric geometry for systematic design comparisons.
• Conduct fan RPM and noise tests across **8 operating modes**, comparing fresh and loaded-filter conditions and documenting ambient measurements.
• Run **CADR tests** using PM2.5 concentration decay and compare rig measurements with CFD findings to inform design decisions.

Propulsion Engineer 06/2025 – 07/2026
Agnikul Cosmos Chennai, India
- Took **flight check valves** from cracking-pressure and flow requirements in stage P&IDs through supplier assessment, sourcing and procurement.
- Ran **qualification and acceptance testing**, including thermal shock, sine/random vibration with leak monitoring, **LN2 cryogenic leak checks** and functional tests; prepared the fixture and test procedures. The valves achieved flight qualification.
- Built an **OpenFOAM conjugate heat transfer workflow** from scratch, coupling hot gas, chamber-wall conduction and regenerative coolant flow.
- Compared **coolant-return predictions with firing measurements**, examining operating-condition differences, model uncertainty and test-sensor placement.
- Analysed **cooling-manifold flow distribution and pressure loss** to guide geometry changes, and reviewed check-valve architecture across stage P&IDs.

Design Engineer 07/2021 – 06/2023
MaDeIT Innovation Foundation Chennai, India
- Owned product design and analysis for incubated deep-tech startups, carrying requirements through **CAD and multi-physics simulation**.
- Designed a **monocoque carbon-fibre UAV airframe**, analysed under static, drop and **fluid-structure interaction** load cases.

Project Intern 04/2021 – 06/2021
DRDO Centre for Airborne Systems Bangalore, India
- Ran **CFD on the aerodynamic impact of a radome** mounted on top of an A321 airframe, comparing the configurations with and without it.

PROJECTS

Flame Stabilisation in a Swirl and Bluff-Body Burner 07/2023 – 06/2025
MTech Thesis Thiruvananthapuram, India
- Identified a **modified k-epsilon model** that brought predicted flame behaviour onto the measured data, then used it to predict where the flame detaches and reattaches across **methane-air equivalence ratios**.
- Linked flame stabilisation to the **recirculation zone and stoichiometric mixture fraction**, using benchmark and experimental comparisons to assess the modelling.

PUBLICATIONS & AWARDS

Stabilization Mechanisms in Partially Premixed CH4/Air Flames in a Swirl and Bluff-Body Burner — Under review - 2026
Publication (Flow, Turbulence and Combustion)
- Correlated **reacting-flow combustion CFD** against experimental measurements on a swirl and bluff-body burner, establishing how a lean flame stays anchored as it approaches blow-off.
- Owned the investigation, data curation and formal analysis across a **seven-author international collaboration**; the same work was selected for poster presentation at **ASPACC 2025** in Singapore.

Effect of Obstruction Geometry in Oscillating Flow Across a Rectangular Channel — 2026
Publication (Springer Nature, Lecture Notes in Mechanical Engineering)
- **First author.** Studied how channel geometry affects heat transfer and pressure loss under oscillating flow.

Design Optimization of a Nozzle and Second Throat Diffuser System for High Altitude Testing — 2019
Publication (Journal of Physics)
- Ran **nozzle and second-throat diffuser CFD** across altitudes for a high-altitude engine test facility, sizing the diffuser for reliable start and pressure recovery. Undergraduate work.

Acoustic Investigation on a UAV Rotor Using a CFD-MRF Approach — 2019
Publication (ASME Gas Turbine India)
- **Co-author.** Used CFD-MRF and acoustic modelling to compare predicted rotor noise between propeller designs.

Impact Behaviour of Composite Materials Using Fluid-Structure Interaction — 2022
Publication (Journal: Materials Today)
- **First author.** Investigated composite UAV frames using coupled aerodynamic and structural analysis.

Design Optimization of a Vertical-Axis Wind Turbine Based on High Power Extraction Using CFD — 2021
Publication (Springer, Innovations in Sustainable Energy and Technology)
- **First author**. Led the CFD methodology and ran both modified configurations, optimising blade geometry for **power extraction from a rotating machine**.

Comparative Structural Analysis of Various Composite Materials Based UAV Propeller — 2021
Publication (IOP Conference Series: Materials Science and Engineering)
- **First author.** Developed the structural analysis and compared composite material options for UAV propellers.

Technical Star for Research — 2022
Award (Kumaraguru Achievers Awards)
- Received the **Technical Star for Research (2022)** and the **Hypersonic Award (2019)** for research work.

EDUCATION

MTech. Aerospace Engineering (Thermal & Propulsion Specialisation) — 07/2023 – 06/2025
Indian Institute of Space Science and Technology — Thiruvananthapuram, India

BE. Aeronautical Engineering (Honour Distinction) — 05/2017 – 05/2021
Kumaraguru College of Technology — Coimbatore, India
- Led a four-person **UAV flight-systems team** at the college research platform, and co-led its education cell, running research-writing sessions and a hackathon.

SKILLS

OpenFOAM | **ANSYS Fluent** | **Conjugate Heat Transfer** | Internal-Flow CFD | Reacting-Flow CFD | **Python Automation** | Model-to-Test Comparison | **Qualification and Acceptance Testing** | Functional and Leak Tests | Cryogenic Leak Checks | Thermal and Vibration Tests | P&IDs | Test Procedures | Fusion 360 | NASA CEA

Languages: English (Fluent), Tamil (Fluent)