

# JACOB KOSHY MULAMOOTIL

Assistant Professor, MED, NIT Calicut, Kozhikode - 673601

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## RESEARCH EXPERIENCE

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**IoE-IISc Postdoctoral Fellow** Nov 2020 - July 2022  
**IISc Bangalore**  
Computational and experimental studies in multiphase flow of atomization and sprays

## EDUCATION

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**Indian Institute of Technology Kharagpur** Degree awarded in January 2020  
**Doctor of Philosophy**  
Department of Mechanical Engineering  
Specialization: Thermal Science and Engineering

**Indian Institute of Technology Kharagpur** Degree awarded in July 2014  
Master of Technology CGPA: 7.98/10  
Department of Mechanical Engineering  
Specialization: Thermal Science and Engineering

**R.V. College of Engineering, Bengaluru** Degree awarded in 2008  
Bachelor of Engineering Score: 74.5/100  
Department of Mechanical Engineering  
Visveswaraiah Technological University, Belagavi, Karnataka

**Christ Junior College, Bengaluru** 2004  
12th Standard (Science), Karnataka Board of Pre-University Education Score: 86.7/100

**Bishop Cotton Boys' School, Bengaluru** 2002  
10th Standard, Indian Certificate of Secondary Education Score: 87.0/100

## RESEARCH ACHIEVEMENTS

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### Journal Publications:

- **Mulamootil, J.K.**, Rath, S. and Dash, S.K., 2021. Relative importance of temperature-dependent properties in non-Newtonian natural convection around curved surfaces. *International Communications in Heat and Mass Transfer*, 124, p.105263.
- **Mulamootil, J.K.** and Dash, S.K., 2020. Augmentation and diminution of non-Boussinesq effects due to non-Newtonian behavior in natural convection. *International Journal of Thermal Sciences*, 151, p.106263.
- **Mulamootil, J.K.** and Dash, S.K., 2019. Significance of non-Oberbeck-Boussinesq effects augmented by power-law rheology in natural convection studies around fins. *Physics of Fluids*, 31(9), p.093104.
- **Mulamootil, J.K.** and Dash, S.K., 2018. Numerical investigation of natural convection heat transfer from an array of horizontal fins in non-Newtonian power-law fluids. *ASME Journal of Heat Transfer*, 140(2), p.022501.

## Conference Publications:

- **Mulamootil, J. K.**, Rath, S., Dash, S. K., Augmentation of non-Boussinesq effects due to shear-rate dependent viscosity in natural convection from fins, *14th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics*, Wicklow, Ireland, July 22-24, 2019, p.227-232.
- Rath, S., **Mulamootil, J. K.**, Dash, S. K., Regimes of validity of the Boussinesq approximation for natural convection from a vertical cylinder in power-law fluids, *14th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics*, Wicklow, Ireland, July 22-24, 2019, p.1319-1324.

## THESIS AND PROJECTS

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### **Doctoral Thesis: Non-Boussinesq effects in natural convection of power-law fluids**

Abstract: An Order-of-Magnitude-Analysis was employed to identify significant temperature dependent thermophysical properties for two classes of commonly encountered non-Newtonian power-law fluids. The identified dependencies were incorporated into the governing equations to arrive at a set of non-Boussinesq equations valid over a practical range of temperatures. The extent and significance of non-Boussinesq effects in non-Newtonian natural convection studies pertaining to optimization and correlation results was elucidated by numerically solving the equations for three specific problems.

### **M.Tech Thesis: Comparison of viscosity models for pseudoplastic non-newtonian fluids.**

Abstract: Key parameters of three non-Newtonian viscosity models were evaluated by fitting them to a set of existing experimental data. Each fitted model was used to solve the classical problem of natural convection from an isothermal vertical flat plate using an in-house code written in Fortran. The obtained solutions were studied to compare the performance of each model.

### **B.E. Project: Design, fabrication and testing of a super fuel-efficient vehicle.**

Abstract: A super-light chassis and streamlined outer body was designed for an aerodynamic single-seater to compete in various international fuel efficiency competitions. The chassis was fabricated using aluminum and the outer body using glass fiber. Modifications to the engine cylinder head to improve combustion characteristics were also proposed.

## INDUSTRIAL EXPERIENCE AT ABB LIMITED, INDIA (2 YEARS, 2 MONTHS)

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### **Low Voltage Drives, Bengaluru**

February 2010 - September 2010

*Design and Engineering*

Optimization of drive cabinet design for space and ventilation purposes. Involved in theorizing the airflow considerations for cabinet ventilation to ensure efficient drive functioning

### **Heating Ventilation and Air Conditioning, Bengaluru**

July 2009 - February 2010

*Design and Engineering*

Involved in the design of an HVAC system for a 7-star hotel in Chennai. Designed a lift well and staircase pressurization system for firefighting

### **Training period**

July 2008 - July 2009

- Robotics, Bengaluru: Designed, installed and successfully commissioned a collector gear handling gripper for transfer of hot gear from heating furnace to quench die within stipulated time
- Turbochargers, Vadodara: Gained knowledge and understanding in order handling and execution, commercial aspects of business, and functioning of a product Business Unit
- Visited ABB Limited's manufacturing units at Nashik, Bangalore, Faridabad and Vadodara gaining valuable industrial exposure

## TECHNICAL EXPERTISE

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<b>Computer Languages</b>	MATLAB, Fortran95
<b>Software</b>	ConvergeCFD (Convergent Science), Ansys Fluent, Ansys Mechanical AutoCAD, CADEM (CNC coding), Solidworks, basic Star-CCM+
<b>Tools</b>	L <sup>A</sup> T <sub>E</sub> X, Engineering Equation Solver, MS Office

## POSITIONS OF RESPONSIBILITY

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**Research Lab Administrator** 2016 - 2019  
*CFD Research Lab* IIT Kharagpur

Responsible for hardware and software resource allocation for Research Lab with over 30 students (M.Tech., Ph.D. and PDFs), including installation and troubleshooting for efficient functioning of the lab. Also coordinated with institute authorities and contractors for the planning, erection and commissioning of a new Numerical Simulation laboratory with a seating capacity of 50 students.

**Inter-Hall Football Captain** 2014 - 2015

Captained the BRH Hall of residence football team for the IIT Kharagpur inter-hall competition.

**Hall Coordinator, IIT Kharagpur Student Welfare Group** 2012 - 2013

Functioned as a bridge between the Institute Counseling Centre and MMM Hall of Residence with a view to assist students in coping with the rigors of campus life and suicide prevention

## ACADEMIC AND EXTRA-CURRICULAR ACHIEVEMENTS

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**Member of Team Garuda** (RVCE Supermileage student team) which designed, built and tested a super fuel-efficient vehicle from the ground up to participate in various fuel efficiency competitions held around the world (such as SAE Supermileage, Shell Eco Marathon etc.). The team was awarded the **Rotary-Brigade Young Achiever award** (Karnataka) for the year 2008

Secured **AIR 558** in the Mechanical specialization of **GATE 2011** (99.31 percentile)

Represented IIT Kharagpur in **football, winning Gold at Shaurya 2012** and participating at the 48th Inter-IIT Sports Meet - 2012

Member of IIT Kharagpur inter-hall **Bronze winning football teams** of MMM hall of residence (2011-2012) and BRH hall of residence (2015-2016)

## REFERENCES

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Ph.D. Supervisor: Prof. Sukanta Kumar Dash  
Professor, ME Dept, IIT Kharagpur  
E-mail: sdash@mech.iitkgp.ac.in  
Office: +91-3222-282918

M.Tech Supervisor: Prof. S Ghosh Moulic  
Professor, ME Dept, IIT Kharagpur  
E-mail: moulic@mech.iitkgp.ac.in  
Office: +91-3222-282988

PDF Mentor: Prof. R. V. Ravikrishna  
Professor, ME Dept, IISc Bangalore  
E-mail: ravikris@iisc.ac.in  
Office: +91-80-22933226