

Dr. Saroj RAY

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Gender: Male

Nationality: Indian

EMPLOYMENT

July 2024 – Assistant Professor, Department of Mechanical Engineering, NIT Rourkela
Present

EDUCATION

March 2021 – Nov 2023 **Postdoctoral Fellow**, Department of Mechanical Engineering, The Hong Kong Polytechnic University, Hong Kong. (QS World University ranking: 65)
Supervisor: Prof. Song Cheng and Prof. Peng Zhang

July 2015 – **Doctor of Philosophy & Master of Science (dual degree)**, Department of Mechanical Engineering, Indian Institute of Technology Madras, India. (QS World University ranking: 285 and QS World University ranking for Mechanical Engineering: 62)

Supervisor: Prof. V. Raghavan

Dissertation Title: Effect of ambient pressure on evaporation of isolated multicomponent fuel droplets – A numerical study

CGPA: 9.1/10

July 2009 – **Bachelor of Technology (Mechanical Engineering)**, National Institute of Technology Rourkela, India.

CGPA: 9.41/10 (*First Class with Distinction*)

RESEARCH EXPERIENCE

The Hong Kong Polytechnic University (2021-2023)

Post-doc: Droplet collisions and microexplosion in emulsified droplets.

Flame propagation in air cargos (Prepared report, perform FDS simulations).

IIT Madras, India (2015 – 2020)

PhD Thesis Title: Effect of ambient pressure on evaporation of isolated multicomponent fuel droplets – A numerical study.

RESEARCH INTERESTS

- **Droplet Dynamics:** Head-on collision of unequal-size droplets on solid surfaces.
- **Microexplosion:** Modeling of puffing and microexplosion in emulsified fuel droplets.
- **Computational Fluid Dynamics:** Numerical simulation of droplet evaporation and droplets collision using Finite Volume Method (FVM).
- **Experiments:** Experimental study on droplets using a digital high-speed camera.
- **Multiphase Flow:** Analysis of multicomponent fuel droplet evaporation, namely biodiesel.
- **Droplet evaporation & combustion:** Investigate high-pressure droplet evaporation of binary hydrocarbon fuel.
- **Wind-tunnel testing:** Dislodging of a water droplet on PMMA and Teflon surfaces.

SKILLS

- **Computational fluid dynamics** simulations and analysis using **Basilisk C, OpenFOAM, and FDS**.
- Experiments using High-speed digital camera.
- Experiments in wind-tunnel.
- Working experience with different Software Packages like: **Basilisk C, OpenFOAM, Fluent, FDS, MATLAB, AutoCAD, Solid Edge, Solidworks**.
- Working experience with **Python, and Python libraries such as Numpy, Scipy, Matplotlib, Pandas, Seaborn**.
- Programing in **C, C++, Fortran, Python**.
- Post-processing and plotting using **Python, MATLAB, Tecplot, ImageJ, Sigma Plot**.

ACHIEVEMENTS & AWARDS

- Delivered invited research talk on “Mathematical insight into fluid dynamic problems” at Nirmala College for Women, Coimbatore, India, on 20 October 2023.
- Half-Time Research Assistantship, Ph.D. Fellowship, MHRD Government of India, July 2015 – July 2020.
- Merit Scholarship for best academic performance for years 2009-2010 and 2011-2012 at NIT Rourkela, India.

INDUSTRY PROJECTS

- **Intelligent Thermal Detection System** to predict fire hazard in air cargos at PolyU, Hong Kong.
- **Design and development of welding fixtures** for motorbike frame, implemented at Bajaj Auto Ltd., Pune, India.

PEER-REVIEWER FOR JOURNAL

- Physics of Fluids (American Institute of Physics)
- Fuel (Elsevier)

RESEARCH PUBLICATIONS

Journal Papers (Published 7):

1. **Saroj Ray**, Yu Han, Zongyu Yue, Hengjie Guo, Christopher Yu Hang Chao, and Song Cheng, New insights into head-on bouncing of unequal-size droplets on a wetting surface. *Journal of Fluid Mechanics*, <https://doi.org/10.1017/jfm.2024.156>.
2. **Saroj Ray**, Yu Han, and Song Cheng, Pinch-off Dynamics in Unequal-Size Droplets Head-on Collision on a Wetting Surface: Experiments and Direct Numerical Simulations. *Physics of Fluids*. 35 (12), 122105, 1-12, <https://doi.org/10.1063/5.0171469> [Q1, I.F. = 4.60]
3. **Saroj Ray**, Y. Chi, P. Zhang, and S. Cheng (2023) “Head-on collision of unequal-size droplets on a wetting surface,” *Physics of Fluids*, 35(2), 022114, 1-9, <https://doi.org/10.1063/5.0139663> [Q1, I.F. = 4.60]
4. **Saroj Ray**, P. Zhang, and S. Cheng, (2023)“ Mathematical modeling of puffing and microexplosion in emulsified fuel droplets containing several bubbles: A case study on n-dodecane/water droplet,” *Fuel*, 345, 128195 <https://doi.org/10.1016/j.fuel.2023.128195> [Q1, I.F. = 7.40]
5. **Saroj Ray**, and V. Raghavan, (2020). Numerical study of evaporation characteristics of biodiesel droplets of Indian origin. *Fuel*, 271, 117637, 1-14, <https://doi.org/10.1016/j.fuel.2020.117637>. [Q1, I.F. = 7.40]
6. **Saroj Ray**, V. Raghavan, and G. Gogos, (2019). Two-phase transient simulations of evaporation characteristics of two-component liquid fuel droplets at high pressures. *International Journal of Multiphase*

Flows, 111, 294-309, <https://doi.org/10.1016/j.ijmultiphaseflow.2018.10.002>.

[Q1, I.F. = 3.80]

7. **Saroj Ray**, V.V.S. Harsha, and V.Raghavan, (2019). Prediction of vapor-liquid equilibrium of ternary system at high pressures. *Archives of Thermodynamics*, 40(2), 137-149, <https://doi.org/10.24425/ather.2019.129545>. [Q3, I.F. = 0.92]

Conference Papers:

1. **Saroj Ray**, Mohd Ibrahim, Numerical analysis of pollutant absorption from post-combustion flue gas on solid absorbents in a fixed-bed reactor, National Conference on Waste to Energy, Carbon Capture, Utilization and Storage [NCWECCUS-2023], December 22-24, NIT Rourkela, Odisha, India.
2. **Saroj Ray**, and Song Cheng, Impact force of ellipsoidal droplets on superhydrophobic surfaces, GPPS International Technical Conference, 17-19 October 2023, Hong Kong.
3. **Saroj Ray**, and V. Raghavan, Two-phase Numerical Study of Evaporation Characteristics of Moving Binary Droplets at High Pressures, 12th Asia-Pacific Conference on Combustion, 1-5 July 2019, Fukuoka International Congress Center, Fukuoka, Japan.
4. **Saroj Ray**, and V. Raghavan, Multi-phase Numerical Study of Evaporation of Suspended Biodiesel Droplets, 11th Asia-Pacific Conference on Combustion, 10-14 December 2017, University of Sydney, New South Wales, Australia.
5. S. Sharma, **Saroj Ray**, P.Sentil, and V.Raghavan, Dislodging of a water droplet on PMMA and Teflon surfaces, Large Scale Multi-disciplinary Systems of National Significance (LAMSYS), 24-26 June 2016, SDSC SHAR, Sriharikota, India.

CERTIFICATIONS

- MATLAB training certificate by MathWorks
- Fluid Dynamic Simulations using OpenFOAM, by Research affairs council, IIT Madras

I hereby declare that the above-mentioned information is correct to the best of my knowledge.

Place: Rourkela
July 19, 2024

Yours Sincerely
Dr. Saroj Ray