Charul Gupta

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1. Qualification

- PhD (2018- pursuing) from IIT Hyderabad
  Research area: An experimental study of flow patterns very near a moving contact line.

  Advisor: Harish N Dixit and Lakshmana D. Chandrala

- Masters in Thermal engineering (2016-2018) from NIT Warangal
- Graduation in Mechanical engineering (2011-2015) from MNNIT Allahabad

2. Skills

- Carried out a detailed study on fluid dynamics problems.
- Expertise in designing and developing experimental setup.
- Performed PIV techniques and other image processing techniques in flow visualization problems in fluid mechanics.
- Have experience of working with MATLAB for data analysis in research work and python for performing pattern recognition.
- Developed CFD codes on the benchmark problems of fluid mechanics in C programming and MATLAB.

3. PhD Thesis: *An experimental study of flow patterns very near a moving contact line*

The present study investigates the flow dynamics very near the moving contact line using experimental tactics. The flow configurations emerging near the contact line are captured by a high speed camera and quantified using particle image velocimetry (PIV) technique. Other quantitative features involving interface shapes and interfacial speed are also quantified to test the earlier theoretical models rigorously. The decades old unresolved problem of singularity also seems to be resolved by identifying the low speed region very near the contact line.

4. MTech. Project: *Effect of MHD on inertial focusing: A Numerical Study*

The study is based on the motivation of removing the impurities from a liquid. We investigated the problem numerically using ANSYS fluent software. We started with the analysis of a flow through a rectangular channel mixed with particles uniformly. The particles do not respond to the flow until exposed with the magnetic and electric fields acting perpendicular to each other. As a result, four different locations are obtained where the particles get focused. The study is also carried out with different geometries.

5. Publications

- Gupta, C., Choudhury, A., Chandrala, L. D., & Dixit, H. N. (2023). An experimental study of flow near an advancing contact line: a rigorous test of theoretical models.*arXiv preprint arXiv:2311.09560*. (Paper under submission)
- Gupta, C., Chandrala, L., & Dixit, H. (2022). An experimental study of flow patterns near a moving contact line. *Bulletin of the American Physical Society*.
- Choudhury, A., Gupta, C., & Dixit, H. N. (2019, November). Flow field near Contact Lines: Role of Inertia. In *APS Division of Fluid Dynamics Meeting Abstracts* (pp. M04-023).
- "Universality of slip flow near a moving contact line " (Manuscript under preparation).
- “An experimental study of flow near a moving contact line at high contact angles” (Manuscript under preparation).

6. Conferences

- International Conference On Multiphase Flow 2023 (ICMF 2023) at Kobe, Japan on the topic “An experimental study of flow patterns near a moving contact line”. (presented a talk)
- Complex Fluids And Soft Matter Conference 2022 (CompFlu 2022) at IIT Kharagpur on the topic "Flow patterns in the vicinity of a moving contact line: an experimental study". (poster presentation)
- Fluid Mechanics And Fluid Power 2022 (FMFP 2022) at IIT Roorkee on the topic "Flow patterns in the vicinity of a moving contact line: an experimental study". (presented a talk)
- Me@75 Research Frontiers Conference 2022 at IISc on the topic "An Experimental study of flow patterns near a moving contact line". (presented a talk)
- Complex Fluids And Soft Matter Conference 2021 (CompFlu) at IIT Gandhinagar on the topic "Flow patterns in the vicinity of a moving contact line: an experimental study". (presented poster)
- Thermal Analysis And Engineering Systems 2018 (ICTASE) at HiCET, Coimbatore on topic "Effect of MHD on inertial focusing: A Numerical Study". (presented a talk)

7. Experience/Training

- Participated in the NPTEL+ workshop “optical measurement techniques in fluid mechanics” (Nov 2023).
- Teaching assistance for NPTEL course on “Interfacial fluid phenomena” conducted by IIT madras (2023) and IIT bombay (2022).
- Participated in Indian National Young Academy of Sciences (INYAS) Flagship Event for Post-PhD Opportunities 2022
- Industrial Training at SHREE GRINDING UNIT LAKSHAR (SHREE CEMENT LTD.), Haridwar. (2013)

8. Interests

- Reading books (started the journey with self-help books to understand myself, now also interested in having deep understanding of the science)