

Vatsal Sanjay

B.Tech, M.Tech

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Physics of Fluids
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On a quest in the world of multi-phase flows

Updated On: December 10, 2020

Research Interests

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|--------------|------------------------------------|--|
| Fluid | ○ Liquid - Liquid Encapsulation | ○ Molecular Dynamics Simulations |
| | ○ Liquid Jets & their Interactions | ○ Liquid Sheets: Formation & Stability |
| | ○ Computational Fluid Dynamics | ○ Interface Reconstruction |
| | ○ Droplets & Bubbles Dynamics | ○ Boiling Heat Transfer |
| Fire | ○ Compartmental Fire | ○ Fire Propagation and Soot Flow |

Education

2018– **Ph.D. (Fluid Dynamics).**

Present Physics of Fluids, University of Twente

Focus on: Volume of Fluid simulations, Drop Impact, Viscoplastic flows, Three phase flows

2013–2018 **B.Tech (Mechanical Engineering) & M.Tech (Thermal Engineering).**

Two-Phase Flow & Instability Lab, Indian Institute of Technology Roorkee.

Focus on: Liquid Jet Dynamics, Formation & Stability of Liquid Chain, Multiscale Numerical Simulations, Flame Dynamics

Graduated: First Division with Distinction (CGPA: *9.10/10*)

2013 **AISSCE**, *High School*, Graduated with *96.4%* marks.

2011 **AISSE**, *Secondary School*, Graduated with CGPA of *10/10*.

Dissertation (B.Tech & M.Tech)

Title Understanding of mutual interactions between liquid jets: Entrainment and sheet formation

Supervisor **Prof. Arup Kumar Das**

I have worked on two major problems: Formation of liquid chain by collision of liquid jets & Air entainment by plunging liquid jet. These interactions are investigated using detailed numerical simulations and in-house experiments. Full text is available at: <https://goo.gl/kws3Nf>

Professional Positions

- 2018 – **Ph.D. Candidate**, *Physics of Fluids group*.
Present University of Twente, Enschede, the Netherlands
Advisor: **Prof. Detlef Lohse**
- May – July, **Research Intern**, *Fluid Mechanics & Acoustics Laboratory - UMR 5509*.
2016 Université Claude Bernard Lyon1, France
Advisors: **Prof. Jean-Philippe Matas**, **Prof. J. John Soundar Jerome**, **Prof. Mickaël Bourgoïn**
- 2014 – 2018 **Research Assistant**, *Two-Phase Flow & Instability Lab*.
Indian Institute of Technology Roorkee, India
Advisor: **Prof. Arup Kumar Das**

Manuscripts in Preparation or Under Review

To access the full-texts, please visit [my web page](#).

- [1] **Sanjay, V**, Lohse, D., and Jalaal, M. “Bursting Bubble in a Viscoplastic medium”. In: *Journal of Fluid Mechanics* (2021).
- [2] Rathia, S. K., **Sanjay, V**, and Das, A. K. “Investigation of the fire propagation across the patterned obstructions with single and two point ignitions”. In: *Fire Technology Journal* (2018).

Research Publications

To access the full-texts, please visit [my web page](#).

- [1] Ramírez-Soto, O., **Sanjay, V**, Lohse, D., Pham, J. T., and Vollmer, D. “Lifting a sessile oil drop from a superamphiphobic surface with an impacting one”. In: *Science advances* 6.34 (2020), eaba4330.
- [2] Jain, A., **Sanjay, V**, and Das, A. K. “Consequences of inclined and dual jet impingement in stagnant liquid and stratified layers”. In: *AIChE journal* 65.1 (2019), pp. 372–384.
- [3] **Sanjay, V** and Das, A. K. “Numerical Assessment of Hazard in Compartmental Fire Having Steady Heat Release Rate from the Source”. In: *Building Simulation* 11.3 (2018), pp. 613–624. DOI: [10.1007/s12273-017-0411-y](#).
- [4] **Sanjay, V** and Das, A. K. “Formation of Liquid Chain by Collision of Two Laminar Jets”. In: *Physics of Fluids* 29.11 (2017), p. 112101. DOI: [10.1063/1.4998288](#).
- [5] **Sanjay, V** and Das, A. K. “On air entrainment in a water pool by impingement of a jet”. In: *AIChE J.* 63.11 (2017), pp. 5169–5181. ISSN: 1547-5905. DOI: [10.1002/aic.15828](#).
- [6] Soni, A., **Sanjay, V**, and Das, A. K. “Formation of fluid structures due to jet-jet and jet-sheet interactions”. In: *Chemical Engineering Science* (). DOI: [10.1016/j.ces.2018.06.055](#).

Scholastic Awards and Achievements

- 2017 **All India Rank 2988**, *Graduate Aptitude Test in Engineering*, among 190648 candidates.
- 2015 **Summer Undergraduate Research Award**, *Indian Institute of Technology Roorkee*.
Awarded summer fellowship for two months long research project
- 2013 **All India Rank 1512**, *JEE Advanced, India*, in top 1% of the total appearing students.
- 2013 **All India Rank 765**, *JEE Mains, India*, Percentile score of 99.8%.

Technical Skills

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|---|--|
| CFD: Gerris, Basilisk C, LAMMPS-SPH & MD, PARIS Simulator, Fire Dynamics Simulator, OpenFOAM, ANSYS-Fluent | Lab based: LabView: Voltage & current module, Conductivity & optical probes, High speed camera imaging & image processing |
| Languages: C, C++, MATLAB, Python, L ^A T _E X | Others: Octave, SolidWorks, AutoCAD |

Invited Presentations

Viscoplastic Flows

- Jul, 2019 ○ Bursting Bubble in a Viscoplastic medium
- Indian Institute of Technology Roorkee, India

Interactions of Liquid Jets

- Jan, 2018 ○ Understanding of Mutual Interactions between Liquid Jets: Sheet Formation
- Physics of Fluids, University of Twente, Enschede, the Netherlands.
- Mar, 2017 ○ On interaction between interfaces: Dynamic-Dynamic & Dynamic-Static
- Cognizance Technical Festival, Indian Institute of Technology Roorkee.
- Jul, 2016 ○ On the air entrainment in a water pool by impingement of jet
- Fluid Mechanics and Acoustics Laboratory, Lyon, France

MATLAB

- 2014-2016 ○ Importance of MATLAB in Engineering Applications
- MIESS, Indian Institute of Technology Roorkee.
- 2015-2017 ○ A lecture on Image Analysis Using MATLAB
- MIESS, Indian Institute of Technology Roorkee.

Contributed Conference Presentations

To access the full-texts, please visit [my web page](#).

- [1] **Sanjay, V**, Chantelot, P., and Lohse, D. “When does a viscous drop stop bouncing?” In: *APS-DFD (Virtual)* (2020).
- [2] **Sanjay, V**, Jalaal, M., and Lohse, D. “Bursting Bubble in a Viscoplastic medium”. In: *18th International Congress on Rheology (Virtual)* (2020).
- [3] **Sanjay, V** and Lohse, D. “Jumping & Bouncing Drops & Bubbles”. In: *Max Planck meeting, Mainz, Germany* (2020).
- [4] **Sanjay, V**, Jain, U., Jalaal, M., Meer, D. van der, and Lohse, D. “Droplet Encapsulation”. In: *APS-DFD, Seattle, US* (2019), B22–001.
- [5] **Sanjay, V**, Jalaal, M., and Lohse, D. “Bursting Bubbles: from Champagne to Mudpots”. In: *Basilisk/Gerris Users’ meeting, Paris, France* (2019).
- [6] **Sanjay, V**, Jalaal, M., and Lohse, D. “Bursting Bubbles: from Champagne to Mudpots”. In: *VPF8 Viscoplastic Fluids: from Theory to Application, Cambridge, UK* (2019).
- [7] **Sanjay, V**, Ramírez-Soto, O., Lohse, D., Pham, J. T., and Vollmer, D. “Impinging drop lifts a sessile drop”. In: *Burgers Symposium, Lunteren, the Netherlands* (2019).
- [8] **Sanjay, V**, Ramírez-Soto, O., Lohse, D., Pham, J. T., and Vollmer, D. “Impinging drop lifts a sessile drop”. In: *9th 4U Summer School Complex Motion in Fluids, Gilleleje, Denmark* (2019).
- [9] Aggarwal, A., **Sanjay, V**, Kumar, P., and Das, A. K. “Generation of a liquid sheet by an oblique impingement of interacting jets: a numerical investigation”. In: *Paper ID: 267, Proceedings of CHEMCON*. 2016.
- [10] Datta, S., **Sanjay, V**, Kumar, P., and Das, A. K. “Investigation of jet atomization - a multi-scale approach”. In: *Paper ID: 218, 6th International and 43rd National Conference on Fluid Mechanics and Fluid Power*. 2016.
- [11] **Sanjay, V** and Das, A. K. “On the gas-liquid entrainment by impingement of liquid jet onto a pool”. In: *Reference #50, 9th International Conference on Multiphase Flow*. 2016.
- [12] **Sanjay, V** and Das, A. K. “Building fire safety: numerical simulation and evacuation planning”. In: *Proceedings of 14th International Conference of the International Building Performance Simulation Association*. 2015, pp. 897–904.