Vatsal Sanjay

Ph.D.

Physics of Fluids Group
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VatsalSy

Date of birth Feb. 5th, 1996
Updated on November 10, 2024

Education

2018–2022 **Ph.D. (Fluid Dynamics)**
Physics of Fluids Group, University of Twente
Supervisor Prof. Dr. Detlef Lohse
Thesis *Viscous free-surface flows*, (OA) DOI: 10.3990/1.9789036554077
Graduated Doctor cum laude, met lof (with distinction).

2013–2018 **B.Tech (Mechanical Engineering) & M.Tech (Thermal Engineering)**
Two-Phase Flow & Instability Lab, Indian Institute of Technology Roorkee.
Thesis *Understanding of mutual interactions between liquid jets: Entrainment and sheet formation*, https://goo.gl/kws3Nf
Supervisor Prof. Arup Kumar Das
Graduated First Division with distinction (CGPA: *9.1/10*).

Professional Experience

2022–2025 **Postdoctoral researcher**, *Physics of Fluids Group*
at University of Twente, Enschede, the Netherlands.

May–July, 2016 **Research Intern**, *Fluid Mechanics & Acoustics Laboratory - UMR 5509*
at Université Claude Bernard Lyon 1, France.

2014–2018 **Research Assistant**, *Two-Phase Flow & Instability Lab*
at Indian Institute of Technology Roorkee, India.

Personal Awards & Achievements

2024 **J. Fluid Mech. outstanding reviewer**, *top 1% of the reviewers in 2023.*

2024 **KIVI Hoogendoorn Fluid Mechanics Award**, *for the best PhD thesis defended in the academic year 2022-2023 in the Netherlands.*

2024 **Young scientist**, *at the 73rd Lindau Nobel Laureate meetings*, among the **seven** participants from the Netherlands, nominated by the Royal Netherlands Academy of Arts and Sciences (KNAW).

2022 **Doctor cum laude**, *met lof (with distinction)*, University of Twente.

2018 **Department Gold Medal**, Indian Institute of Technology Roorkee.

2017 **All India Rank 2988**, *GATE*, among 190648 candidates.

2015 **Summer Undergraduate Research Award**, Indian Institute of Technology Roorkee.

2013 **All India Rank 1512**, *JEE Advanced, India*, top 1% of the appearing students.

2013 **All India Rank 765**, *JEE Mains, India*, Percentile score of 99.8%.

2013 **City Rank 1**, *AISSCE (High School)*, highest score (96.4%) in the district of Darbhanga.

Service to the Community

Co-Organization

2022–Now Physics of Fluids weekly seminar (about 10 international speakers over one year with average 40 participants).

May 2025 Symposium on "Bubbles & bubbly flows" (about 75 participants).

Jun 2024 Lorentz Center workshop on "(De)Constructing Complex Contact Lines" (about 25 participants).

May 2024 35th Dutch Soft Matter meeting (about 100 participants). Received NWO Scientific Meetings and Consultations grant (Domain: Science)

Oct 2023 Flow for Future conference: 25 years of Physics of Fluids (about 200 participants).

Referee

2018–Now J. Fluid Mech. (72), Phys. Rev. Lett. (5), Phys. Rev. Fluids (2), Phys. Rev. E (6), among others.

Research Funding

2023 10 million CPU hours or EUR 150000 computational research grant as Co-PI for the Snellius High-Performance Cluster in the Netherlands.

Scientific Outreach

2020–Now Twitter account for Physics of Fluids Group, @poftwente.

2022–Now APS-DFD peer mentoring program (as a mentor).

2022–Now Skype a Scientist: interact with high-school students.

2022–2023 Physicist To-Go (APS): interact with high-school students.

2021 Panel discussion on Future of fluid dynamics

2021 Panel discussion on Research & higher education

Supervision & Teaching

Theses Supervised

PhD A. Bhargava (Topic: Inertial contact lines, ongoing since Jan '24)

A. Dixit (Topic: Non-Newtonian flows, ongoing since Jul '23)

Masters J. Talukdar (ongoing), S. van den Heuvel, C. H. Maurits ('23), T. Appleford ('22), S. Meuleman ('20)

Bachelors	J. Talukdar ('23), T. Heijink ('21), T. Kroeze ('20), C. Verschuur ('20), P. J. Dekker ('19), L. Bruggink ('19)

Teaching Assistant

2018–Now	Advanced Fluid Mechanics, University of Twente.
2017–2018	Two Phase Flow and Heat Transfer, Indian Institute of Technology Roorkee.

Summary of Key Numbers (November 10, 2024)

- Researcher ID: K-1856-2019
- Orcid: 0000-0002-4293-6099
- Hirsch-index: H = 9 (Google Scholar), 7 (Web of Science)
- i10-index 8 (Google Scholar)
- Research Interest Score (ResearchGate) ≈ 745

Peer-Reviewed Publications

1. Arivazhagan G. Balasubramanian, **Vatsal Sanjay**, Maziyar Jalaal, Ricardo Vinuesa, and Outi Tammisola,
   Bursting bubble in an elasto-viscoplastic medium,
   J. Fluid Mech., accepted manuscript (2024) [35 pages];
   (OA) DOI: 10.48550/arXiv.2409.14897.

2. Lohit Kayal, **Vatsal Sanjay**, Nikhil Yewale, Anil Kumar, and Ratul Dasgupta,
   Focusing of concentric free-surface waves,
   J. Fluid Mech., accepted manuscript (2024) [41 pages];
   (OA) DOI: 10.48550/arXiv.2406.05416.

3. **Vatsal Sanjay**, Bin Zhang, Cunjing Lv, and Detlef Lohse,
   The role of viscosity on drop impact forces on non-wetting surfaces,
   J. Fluid Mech., accepted manuscript (2024) [24 pages];
   (OA) DOI: 10.48550/arXiv.2311.03012.

4. **Vatsal Sanjay**, Pierre Chantelot, and Detlef Lohse,
   When does an impacting drop stop bouncing?,
   J. Fluid Mech., 958, A26 (2023) [20 pages];
   (OA) DOI: 10.1017/jfm.2023.55.

5. **Vatsal Sanjay**, Srinath Lakshman, Pierre Chantelot, Jacco H. Snoeijer, and Detlef Lohse,
   Drop impact on viscous liquid films,
   J. Fluid Mech., 958, A25 (2023) [28 pages];
   (OA) DOI: 10.1017/jfm.2023.13.

6. Bin Zhang, **Vatsal Sanjay**, Songlin Shi, Yinggang Zhao, Cunjing Lv, Xi-Qiao Feng, and Detlef Lohse,
   Impact forces of water drops falling on superhydrophobic surfaces,
   Phys. Rev. Lett. 129, 104501 (2022) [7 pages],

DOI: 10.1103/PhysRevLett.129.104501, OA: 10.48550/arXiv.2202.02437;
see also

- As of March/April 2024, this *highly cited paper* received enough citations to place it in the top 1% of the academic field of Physics based on a highly cited threshold for the field and publication year. Source: Web of Science.
- Editor's Suggestion of that issue.
- Davide Castelvecchi, Research Highlight: "The physics of a bouncing droplet's impact", Nature, article: d41586-022-02302-w (29/8/2022)

7. **Vatsal Sanjay**[*], Uddalok Sen[*], Pallav Kant, and Detlef Lohse,
Taylor-Culick retractions and the influence of the surroundings,
J. Fluid Mech. 948, A14 (2022) [37 pages];
(OA) DOI: 10.1017/jfm.2022.671.

8. **Vatsal Sanjay**, Detlef Lohse, and Maziyar Jalaal,
Bursting bubble in a viscoplastic medium,
J. Fluid Mech. 922, A22 (2021) [24 pages];
(OA) DOI: 10.1017/jfm.2021.489.

9. Olinka Ramirez-Soto[*], **Vatsal Sanjay**[*], Detlef Lohse, Jonathan T. Pham, and Doris Vollmer,
Lifting a sessile oil drop with an impacting one,
Sci. Adv. 6, eaba4330 (2020) [11 pages];
(OA) DOI: 10.1126/sciadv.aba4330.

10. Abhinav Jain, **Vatsal Sanjay**, and Arup Kumar Das,
Consequences of inclined and dual jet impingement in stagnant liquid and stratified layers,
AlChE J. 65(1), 372-384 (2019) [12 pages],
DOI: 10.1002/aic.16373, OA: archived pdf.

11. Anurag Soni, **Vatsal Sanjay**, and Arup Kumar Das,
Formation of fluid structures due to jet-jet and jet-sheet interactions,
Chem. Eng. Sci. 191, 67-77 (2018) [11 pages],
DOI: 10.1016/j.ces.2018.06.055, OA: archived pdf.

12. **Vatsal Sanjay** and Arup Kumar Das,
Numerical assessment of hazard in compartmental fire having steady heat release rate from the source,
Build. Simul. 11(3), 613-624 (2018) [12 pages],
DOI: 10.1007/s12273-017-0411-y, OA: archived pdf..

13. **Vatsal Sanjay** and Arup Kumar Das,
On air entrainment in a water pool by impingement of a jet,
AIChE J. 63(11), 5169–5181 (2017) [23 pages],
DOI: 10.1002/aic.15828, OA: archived pdf.

14. **Vatsal Sanjay** and Arup Kumar Das,
Formation of liquid chain by collision of two laminar jets,

Phys. Fluids 29, 112101 (2017) [12 pages];
DOI: 10.1063/1.4998288, OA: archived pdf.

*equal contribution

Works Under Review

1. **Vatsal Sanjay** and Detlef Lohse,
   Unifying theory of scaling in drop impact: Forces & maximum spreading diameter,
   submitted to Phys. Rev. Lett. and received positive review in the first round,
   (OA) DOI: 10.48550/arXiv.2408.12714.

2. Ayush K. Dixit, Alexandros Oratis, Konstantinos Zinelis, Detlef Lohse, and **Vatsal Sanjay**,
   Viscoelastic Worthington jets & droplets produced by bursting bubbles,
   submitted to J. Fluid Mech. and received positive review in the first round,
   (OA) DOI: 10.48550/arXiv.2408.05089.

3. Aleksandr Bashkatov, Florian Bürkle, Çayan Demirkır, Wei Ding, **Vatsal Sanjay**, Alexander Babich, Xuegeng Yang, Gerd Mutschke, Jürgen Czarske, Detlef Lohse, Dominik Krug, Lars Büttner, and Kerstin Eckert,
   Electrolyte spraying within H_2 bubbles during water electrolysis,
   submitted to Nat. Commun.,
   (OA) DOI: 10.48550/arXiv.2409.00515.

Invited & Contributed Talks

1. 9.10.2024,
   Hydrodynamic singularities in soft matter flows,
   invited talk at Fluid Dynamics Research Centre, University of Warwick, UK.

2. 25.9.2024,
   Drop Impact Forces,
   contributed talk at 12$^{\text{th}}$ Liquid Matter Conference, Mainz, Germany

3. 16.9.2024,
   A unifying approach for drop impact dynamics on rigid surfaces,
   contributed talk at 1$^{\text{st}}$ European Fluid Dynamics Conference, Aachen, Germany

4. 12.4.2024,
   Soft matter singularities,
   invited talk at Institute for Multiscale Thermofluids–Seminar Series, University of Edinburgh, Scotland (UK).

5. 9.4.2024
   Bursting bubbles in a viscoelastic medium,
   contributed talk at the Annual European Rheology Conference in Leeds, UK.

6. 4.3.2024,
   Deformable soft matter,
   invited talk at Dynamics of interfaces, University of Augsburg, Germany.

7. 21.11.2023,
   A unifying approach to account for droplet impact forces,
   contributed talk at APS-DFD in Washington, DC, USA.

8. 20.1.2023,
   Impact of droplets,
   invited talk at Université Claude Bernard Lyon 1, France.

9. 10.1.2023,
   Impact of droplets,
   invited talk at the IIT-Delhi, India.

10. 4.1.2023,
    Impact of droplets,
    invited talk at the IIT-Patna, India.

11. 26.12.2022,
    Taylor-Culick retractions,
    invited talk at the IIT-Kharagpur, India.

12. 16.12.2022,
    Jumping & Bouncing Drops & Bubbles,
    contributed talk at the Annual Meeting of the Indian Fluid Dynamics Society, FMFP-2022,
    at IIT-Roorkee, India.

13. 12.12.2022
    Taylor-Culick retractions,
    invited talk at the IIT-Roorkee, India.

14. 7.12.2022
    Drop impact forces,
    invited talk at the IIT-Bombay, India.

15. 21.11.2022,
    Impact forces of water drops falling on superhydrophobic surfaces,
    contributed talk at APS-DFD in Indianapolis, Indiana, USA.

16. 26.10.2022,
    Drop impact forces,
    invited talk at the Complex Fluids and Soft Matter (CFSM) Seminar Series, Virtual.

17. 12.10.2022,
    Drop impact forces,
    invited talk at the Virtual University of Arkon.

18. 14.9.2022,
    When does an impacting drop stop bouncing?,
    contributed talk at EFMC14, Athens, Greece.

19. 14.3.2022,
    Drop impact forces,
    contributed talk at Max Planck meeting, Enschede, the Netherlands.

20. 21.11.2021,
    Viscous dissipation dictates Taylor-Culick type retractions,
    contributed talk at APS-DFD in Phoenix, Arizona, USA.

21. 22.11.2020,
    When does a viscous drop stop bouncing?,
    contributed talk at APS-DFD in virtual Chicago.

22. 10.2.2020,
    Jumping & Bouncing Drops & Bubbles,
    contributed talk at Max Planck meeting, Mainz, Germany.

23. 23.11.2019,
    Droplet Encapsulation,
    contributed talk at APS-DFD in Seattle, Washington, USA.

24. 18.9.2019,
    Bursting Bubbles: from Champagne to Mudpots,
    contributed talk at VPF8 Viscoplastic Fluids: from Theory to Application, Cambridge, UK.

25. 23.8.2019,
    Impinging drop lifts a sessile drop,
    contributed talk at 9^{th} 4U Summer School Complex Motion in Fluids, Gilleleje, Denmark.

26. 17.6.2019,
    Bursting Bubbles: from Champagne to Mudpots,
    contributed talk at Basilisk/Gerris Users' Meeting 2019, Paris, France.

27. 8.1.2018,
    Formation of liquid chain by collision of two laminar jets,
    invited talk at the Physics of Fluids Group, University of Twente, the Netherlands.

28. 27.3.2017,
    Understanding of mutual interactions between liquid jets: Entrainment and sheet formation,
    invited talk at the Cognizance technical festival at IIT-Roorkee, India.

29. 16.12.2016,
    Investigation of jet atomization: a multi-scale approach,
    contributed talk at the 6^{th} International and 43^{rd} National Conference on Fluid Mechanics and Fluid Power, Allahabad, India.

30. 24.5.2016,
    On the gas-liquid entrainment by impingement of liquid jet onto a pool,
    contributed talk at the 9^{th} International Conference on Multiphase Flow, Florence, Italy.

31. 8.12.2015,
    Building fire safety: numerical simulation and evacuation planning,
    contributed talk at the 14^{th} International Conference of the International Building Performance Simulation Association at Hyderabad, India.