Jibu Tom Jose

Postdoctoral Research Fellow, Technion – Israel Institute of Technology

jibu.jose@campus.technion.ac.il
jibutomjose@gmail.com
Haifa, Israel
ORCID · Google Scholar · Lab Profile

RESEARCH PROFILE

Experimental fluid mechanician investigating how unsteady flows and coherent structures interact with solid boundaries, moving bodies and fluid interfaces. My work spans turbulent separated flows, dynamic stall, buoyancy-driven body motion and deformable liquid–gas interfaces, combining PIV, volumetric particle tracking, refractive-index-matched imaging and pressure reconstruction to connect three-dimensional flow organization with momentum transport, pressure and hydrodynamic loads. I develop experimental facilities and physics-constrained methods, including LE-DM, an open-source Lagrangian-to-Eulerian method that explicitly accounts for moving boundaries, and uPrime, an installable Python package and GUI for PIV and CFD analysis. This work has produced seven first- or co-first-author journal papers. Ongoing work on boiling and bubble-driven convection provides a starting point for extending these capabilities toward interfacial heat and mass transfer.

ACADEMIC APPOINTMENTS

2022 – present **Postdoctoral Research Fellow** · Technion – Israel Institute of Technology, Haifa, Israel
Research group led by Asst. Prof. Omri Ram · Department of Mechanical Engineering. Co-established the Transient Fluid Mechanics Laboratory and developed its experimental capabilities. Lead experimental investigations of separated flows, freely moving bodies, liquid–gas interfaces and shock-driven flows, with responsibility for experimental design, optical arrangements and instrumentation; contribute to ongoing boiling and bubble-driven convection experiments. Developed LE-DM and uPrime. Primary day-to-day research mentor for three M.Sc. students and one Ph.D. student, and mentor to undergraduate researchers.

EDUCATION

2014 – 2022 **Ph.D., Mechanical Engineering** · Johns Hopkins University, Baltimore, MD, USA
Thesis: *On the Interplay between Flow and Pressure Fields around an Airfoil Undergoing Dynamic Stall* · Advisor: Prof. Joseph Katz

2014 – 2016 **M.S.E., Mechanical Engineering** · Johns Hopkins University, Baltimore, MD, USA
Advisor: Prof. Joseph Katz

2012 – 2014 **M.Tech., Aerospace Engineering** · IIT Kanpur, India
Thesis: *Lift Augmentation Using Passive Control on Backward-Facing Stepped Airfoils at Low Re* · Advisor: Prof. Kamal Poddar

2008 – 2012 **B.Tech., Aerospace Engineering** · Amrita Vishwa Vidyapeetham, India

LABORATORY DEVELOPMENT & EXPERIMENTAL FACILITIES

Technion laboratory	Co-established the Transient Fluid Mechanics Laboratory with Assistant Professor Omri Ram, developing it from a temporary space into a fully equipped research facility with capabilities for advanced flow measurements, multiphase experiments and shock-driven flows.
Shock tube	Designed, built and automated a 7 m shock tube, including electronics, sensor integration, multi-instrument synchronization, motorized traversal and LabVIEW/Arduino control. Its control system remains the core of the facility, now run with new test sections.
Water tunnel	Specified the flow quality, instrumented and calibrated the laboratory's large recirculating water tunnel, establishing its operating envelope.
RIM tomo-PTV	Established time-resolved four-camera tomographic PTV with refractive-index matching for freely moving, optically hidden bodies (J3), the measurement platform behind LE-DM (J1).
Tomo + PSF imaging	Built a five-camera system combining tomographic and PSF-engineered imaging, used to validate the single-camera PET-PIV method (J8).
Interface scanning	Built a fluorescence-based laser-sheet scanning system with stereo imaging that maps liquid–gas interface shape with 0.1 mm precision (J5).
Boiling facility	Contributed to the design of single- and multi-bubble boiling facilities; currently involved in confined-cell experiments on boiling and bubble-driven convection using digital holography to track bubble growth and evolution.
RIM water tunnel (JHU)	Designed and built a large refractive-index-matched recirculating water tunnel using more than 2,000 L of sodium iodide solution, including the mixing plant, storage, pressure and vacuum control, an inline cyclone bubble separator (P4) and hydraulic calibration.

PUBLICATIONS

Bold *= Jibu Tom Jose.* · * *co-first author* · † *mentored student.*

Journal Articles | Published or accepted

J1. Jose, J.T., Jacobson, A., Shenoy, D.V., Frankel, S.H., & Ram, O. (2026). Dynamic masking for boundary-aware velocity reconstruction in volumetric particle tracking with moving solids. *Measurement Science and Technology* 37(39), 395302. [DOI]

J2. Jose, J.T., Friedmann, G.†, Feld, D.†, & Ram, O. (2026). Effect of expansion geometry on turbulence in axisymmetric pipe flows. *Physical Review Fluids* 11(3), 034607. [DOI]

J3. Jose, J.T.*, Ben-Harosh, A.*†, & Ram, O. (2026). On the application of refractive index matching to study the buoyancy-driven motion of spheres. *International Journal of Multiphase Flow* 197, 105597. [DOI]

J4. **Jose, J.T.**, Lu, Y., Agarwal, K., & Katz, J. (2026). Flow, pressure, and aerodynamic loads on an oscillating airfoil undergoing dynamic stall. *AIAA Journal* 64(10), 5795–5814. [DOI]

J5. Einhorn, A.R.*, **Jose, J.T.***, Zigelman, A.*, Gat, A.D., & Ram, O. (2025). Interface shape surrounding anisotropic particles held at the liquid–gas interface. *Journal of Fluid Mechanics* 1021, A22. [DOI]

J6. Gichon, Y.*, **Jose, J.T.***, Chandravamsi, H., Evron, Y., & Ram, O. (2024). The dynamics of shock wave propagation far downstream of an abrupt area expansion. *Journal of Fluid Mechanics* 997, A30. [DOI]

J7. **Jose, J.T.**, Friedmann, G.†, & Ram, O. (2026). Coherent structure transport in turbulent axisymmetric pipe expansions. *Physical Review Fluids* (accepted). [DOI] [arXiv]

Submitted or under review

J8. Xiao, D., **Jose, J.T.**, Parizat, A., Kedem, R.O., Sznitman, J., Ram, O., & Shechtman, Y. High-density monocular 3D particle image velocimetry by wavefront shaping and deep learning. *IEEE TPAMI* (under review). [arXiv]

J9. Zuckerman, S.†, **Jose, J.T.**, Levi, O., & Ram, O. Flow separation and turbulence production over trapezoidal protrusions. *Experimental Thermal and Fluid Science* (under review). [arXiv]

J10. **Jose, J.T.**, & Ram, O. (2026). uPrime: An open-source application and Python package for turbulence analysis of PIV and CFD velocity fields. *Journal of Open Source Software* (submitted).

Conference Proceedings

P1. **Jose, J.T.**, Ben-Harosh, A.†, Friedmann, G.†, Feld, D.†, & Ram, O. (2024). A Refractive Index Matched Experimental Investigation of the Dynamics of Inertial Spheres Across Round Pipes and Buoyancy-Driven Flows. *21st Int. Symp. Laser & Imaging Techniques to Fluid Mechanics*, Lisbon, Portugal, pp. 1–13. [DOI]

P2. **Jose, J.T.**, Ben-Harosh, A.†, & Ram, O. (2026). Tomographic Particle Tracking Velocimetry of Flow Around Buoyancy-Driven Transparent Solids. *22nd Int. Symp. Laser & Imaging Techniques to Fluid Mechanics*, Lisbon, Portugal. [DOI]

P3. Zuckerman, S.†, **Jose, J.T.**, & Ram, O. (2026). Geometry-induced flow separation over surface-mounted trapezoidal protrusions. *14th Int. Symp. on Turbulence and Shear Flow Phenomena (TSFP14)*, Heidelberg, Germany.

P4. Lu, Y., Ram, O., **Jose, J.T.**, Agarwal, K., & Katz, J. (2021). A water tunnel with inline cyclone separator for removing freestream bubbles. *11th Int. Symp. on Cavitation (CAV2021)*, Daejeon, South Korea.

RESEARCH SOFTWARE & OPEN DATA

LE-DM v1.0 — **Lead developer.** Open-source Lagrangian-to-Eulerian reconstruction that converts volumetric particle tracks into gridded velocity fields around moving rigid bodies of arbitrary shape while enforcing incompressibility and boundary kinematics. By updating the body mask throughout the reconstruction, LE-DM explicitly accounts for moving boundaries, a capability supported by very few existing methods. To our knowledge, it is the only method of its kind available as open-source software, released with its validation datasets. Pressure extension (LE-PDM) in preparation. [GitHub] · [Paper] · [Validation dataset]

uPrime v0.9.1 — **Lead developer and maintainer.** Installable open-source Python package (`uprime-piv`) with a reusable `uprime.core` analysis API and PyQt6 desktop GUI for PIV and CFD data. Provides turbulence statistics and budgets, probability distributions, spectra, spatial correlations, POD/DMD, vortex identification and anisotropy analysis. Available through PyPI; software paper submitted (J10). [Website] · [GitHub] · [PyPI] · [DOI]

FELLOWSHIPS & SCHOLARSHIPS

2023 – 2025 — **Technion Postdoctoral Fellowship** · Technion – Israel Institute of Technology.

2015 – 2022 — **Graduate Research Assistant Fellowship** · Johns Hopkins University.

2014 – 2015 — **Whiting School Doctoral Fellowship** · Johns Hopkins University.

2014 — **Mechanical Engineering Departmental Fellowship** · Johns Hopkins University.

2012 – 2014 — **MHRD Postgraduate Fellowship** · Government of India.

GRANT PROPOSAL CONTRIBUTIONS

The proposals below were led by Asst. Prof. Omri Ram. My contributions are stated for each proposal.

2026 — **ACS Petroleum Research Fund (PRF), New Directions Grant** · *Transient Evaporation Dynamics of Liquid Sprays on Superheated Surfaces* (funded; project scheduled to begin in 2027). Contributed to proposal writing.

2026 — **Pazy Foundation Research Grant** · *Cavitation Inception on Heated Wavy Walls.* Wrote proposal sections and contributed to experimental planning.

2026 — **Israel Science Foundation (ISF)** · *Transient Loading and Start-up in Shock-Driven Flow Through Local Constrictions.* (under review) Contributed to selected experimental aspects of proposal development.

2025 — **Israel Science Foundation (ISF)** · *Cavitation Inception Caused by Isolated Surface Irregularities.* Wrote proposal sections and provided preliminary experimental data.

INVITED TALKS

Jul. 2026 — **Seeing the unseen: Refractive-index-matched diagnostics for flows around hidden boundaries and moving solids**
Faculty of Mechanical Engineering, University of Ljubljana, Ljubljana, Slovenia.

Oct. 2023 — **Refractive Index Matched Experiments in Transient Phenomena: from Airfoils to Pipes**
FLOW Seminar Series, KTH Royal Institute of Technology, Stockholm, Sweden.

CONFERENCE PRESENTATIONS

Bold = Presenter

C1. Jose, J.T. et al. (2026). Tomographic PTV of flow around buoyancy-driven transparent solids. *22nd Lisbon Symposium*, Lisbon, Portugal.

C2. Jose, J.T. et al. (2025). Experimental study of spheres convected in turbulent pipe flow and across a sudden expansion. *12th Int. Conf. on Multiphase Flow (ICMF)*, Toulouse, France.

C3. Jose, J.T. et al. (2025). Experimental investigation of 3D flow fields around buoyancy-driven spheres. *12th Int. Conf. on Multiphase Flow (ICMF)*, Toulouse, France.

C4. Jose, J.T. et al. (2024). Turbulent flow across axisymmetric expansion in round pipes. *1st European Fluid Dynamics Conference (EFDC1)*, Aachen, Germany.

C5. Jose, J.T. et al. (2024). Refractive index matched investigation of inertial spheres in pipes and buoyancy-driven flows. *21st Lisbon Symposium*, Lisbon, Portugal.

C6. Jose, J.T. et al. (2023). Turbulence characteristics of axisymmetric pipe flow across varying cross section. *76th APS-DFD Meeting*, Washington, DC.

C7. Jose, J.T. et al. (2023). Shock wave phenomena in ducts with abrupt area expansions. *76th APS-DFD Meeting*, Washington, DC.

C8. Jose, J.T. et al. (2023). Inertial solid particles approaching an area change in turbulent pipe flow. *18th European Turbulence Conference (ETC18)*, Valencia, Spain.

C9. Jose, J.T. et al. (2023). Flow, pressure, lift, and moment during dynamic stall of an oscillating airfoil. *18th European Turbulence Conference (ETC18)*, Valencia, Spain.

C10. Jose, J.T. et al. (2023). Flow and pressure fields around a harmonically oscillating airfoil undergoing dynamic stall. *68th Israel Physical Society Annual Meeting*, Tel Aviv.

C11. Jose, J.T. et al. (2022). Pressure field and loads on a harmonically pitching airfoil undergoing dynamic stall. *14th European Fluid Mechanics Conference (EFMC14)*, Athens, Greece.

C12. Jose, J.T. et al. (2022). Interplay between flow and pressure fields around an airfoil undergoing dynamic stall. *75th APS-DFD Meeting*, Indianapolis, IN.

C13. Jose, J.T. et al. (2021). Reynolds number and reduced frequency effects on instantaneous pressure and loads on a pitching airfoil. *74th APS-DFD Meeting*, Phoenix, AZ.

C14. Jose, J.T. et al. (2020). Instantaneous pressure field and aerodynamic loads on a harmonically pitching airfoil. *73rd APS-DFD Meeting*, Chicago, IL.

C15. Jose, J.T. et al. (2019). Flow and pressure fields around a harmonically pitching airfoil. *72nd APS-DFD Meeting*, Seattle, WA.

TEACHING EXPERIENCE

2025 – 2026 **Teaching Assistant; PIV Module Lead** · Advanced Measurement Techniques in Fluid Mechanics · *Technion*
Taught both the PIV and Schlieren modules in 2025, preparing and calibrating apparatus, teaching measurement principles and supervising three-hour laboratory sessions. In 2026, trained a new Ph.D. student to take over Schlieren instruction and continued as PIV module lead, including image acquisition, processing and report assessment.

2015 – 2018 **Teaching Assistant** · Jet & Rocket Propulsion; Thermodynamics · *Johns Hopkins University*
Four semesters across undergraduate courses, with cohorts of up to 88 students. Led recitations, held office hours, prepared and assigned homework, and graded coursework.

2013 – 2014 **Teaching Assistant** · Master's-level Aerodynamics I; Aerodynamics Laboratory · *IIT Kanpur*

Teaching interests include fluid mechanics, aerodynamics, thermodynamics, heat transfer, propulsion, multiphase flows and experimental methods.

STUDENT RESEARCH MENTORING

2022 – present **Transient Fluid Mechanics Lab, Technion**
Primary day-to-day research mentor within the supervision structure led by Asst. Prof. Omri Ram: Shahar Zuckerman, Ph.D. student (J9, P3); Gal Friedmann, Aviel Ben-Harosh and Dvir Feld, M.Sc. students (all graduated; J2, J3, J7, P1, P2).
Undergraduate projects: Mentoring in experimental fluid mechanics, laboratory methods and measurement analysis.

2016 – 2020 **JHU Laboratory of Experimental Fluid Dynamics**
Graduate, undergraduate and high-school students; water-tunnel operation, experimental design and PIV.

HONORS, AWARDS & PROFESSIONAL MEMBERSHIPS

2013 Academic Excellence Award · *IIT Kanpur*

2012 Academic Excellence Award · *Amrita Vishwa Vidyapeetham*

2023 – present Israel Physical Society

2018 – 2024 American Physical Society (APS-DFD)

2012 – 2015 American Institute of Aeronautics and Astronautics (AIAA)

TECHNICAL EXPERTISE

Experimental methods	Time-resolved, stereo and tomographic PIV/PTV · Refractive-index matching · Schlieren imaging · High-speed imaging · Synchronized pressure measurements · Optical access and facility instrumentation
Flow analysis	Velocity and pressure reconstruction · Boundary-aware particle tracking · Turbulence statistics and budgets · Probability distributions · POD/DMD · Spectral and correlation analysis · Vortex identification
Programming	C/C++ · Python · MATLAB · LabVIEW · LaVision DaVis · PIVlab
Languages	English (fluent) · Malayalam (native) · Hindi (advanced)