KRISHNAMURTHY MURALIDHAR (K. Muralidhar)

About:

K. Muralidhar is Professor Emeritus in the Department of Mechanical Engineering at the Indian Institute of Technology Kanpur, where he started his career in 1987. He has a PhD from the University of Delaware (1985) and has postdoctoral experience at Lawrence Berkeley Laboratory, USA. He has guided over 35 doctoral students and has completed several funded research projects in the areas of wake dynamics, transport in porous media, crystal growth, and biomedical flows. He has published over 200 international journal papers and given over 20 plenary lectures at major international conferences. He has co-authored ten monographs on optical measurement techniques, transport phenomena in porous media, droplet dynamics, and modeling dropwise condensation. He has coordinated a national initiative on solar hydrogen generation for DST, a multi-institutional project on CFD code development on unstructured grids for DAE, and an initiative on futuristic mechanics with IGCAR Kalpakkam. Dr Muralidhar is presently working on an institute initiative to develop a blood pump for the human heart. His present work relates to moisture condensation over patterned and mesh-like surfaces, supercritical N_2 as a heat transfer fluid, and blood rheology. He is the past-President, National Society of Fluid Mechanics and Fluid Power (India) and the editor-in-chief of Journal of Flow Visualization and Image Processing. He is an elected Fellow of the American Society of Thermal and Fluid Engineers, the Indian National Academy of Engineering, and the National Academy of Science, India.

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EDUCATIONAL QUALIFICATIONS

Doctor of Philosophy (Applied Science), April 1985, University of Delaware, Newark DE, USA

Master of Technology (Mechanical Engineering), 1981, Indian Institute of Technology Madras, India

Bachelor of Engineering (Mechanical Engineering), 1979, Visvesvaraya Regional College of Engineering, Nagpur, India

POSITIONS HELD

i. July 2024 till present, Professor Emeritus, Indian Institute of Technology, Kanpur (India).

ii. June 2009 – June 2024, Senior Professor (HAG), Indian Institute of Technology, Kanpur (India).

iii. December 1995 to June 2009, Professor, Indian Institute of Technology, Kanpur (India).

iv. March 1993 to December 1995, Associate Professor, IIT, Kanpur, India.

v. July 1987 to March 1993, Assistant Professor, IIT Kanpur, India.

vi. January 1986 to July 1987, Post-doctoral Fellow, Lawrence Berkeley Laboratory, Berkeley, USA.

vii. April 1985 to December 1985, Post-doctoral Fellw, University of Delaware, Newark, DE USA.

VISITING POSITIONS

i. August 2020 onward, Distinguished Honorary Professor, Amity School of Engineering and Technology, Amity University, Noida Campus, India.

ii. June-July 2019, Visiting Professor, Kutateladze Institute of Thermophysics, State University of Novosibirsk, Russia

iii. August 2003 – December 2003, Adjunct Professor, Mewbourne School of Petroleum and Geological Engineering, and Department of Mechanical Engineering, University of Oklahoma, USA.

iv. 23rd June 2007 – 6th July 2007; 4 June – 20 June 2008; 6 July – 16 July 2009, Visiting Faculty, Computer Vision Laboratory, Department of Electrical Engineering, Swiss Federal Institute of Technology (ETH), Zurich, Switzerland.

v. May-July 1999, INSA/JSPS Invitation Fellow, Kyoto University, Kyoto, Japan.

vi. June-July 1997, Visiting Research Professor, SUNY Stony Brook, USA.

vii. August 1996 to May 1997, JSPS Invitation Fellow, Kyoto University, Kyoto, Japan.

ADMINISTRATIVE

1. Dean: Faculty Affairs, January 2016 – February 2019.
2. Dean: Research and Development, January 2015 to May 2015.
3. Dean: Research and Development, January 2008 to January 2011.
4. Head: Department of Mechanical Engineering, June 2005 to February 2008.
5. Chairman GATE, JMET-2006 and JAM-2006, May 2005 to June 2006.

AWARDS/RECOGNITION

i. **Fellow**-ASTFE (American Society of Thermal and Fluids Engineering), since April 2019.

ii. **Fellow** of the National Academy of Sciences (2014).

iii. **Fellow** of the Indian National Academy of Engineering (2006).

iv. Dr. B.H. Laxmana Gowda **Lifetime Achievement award** of the National Society of Fluid Mechanics and Fluid Power (2024).

v. **Editor-in-Chief**, Journal of Flow Visualization and Image Processing, since January 2018 (continuing).

vi. Delivered the M.V. Krishnamurthy endowed **Plenary lecture** entitled SPREADING AND COALESCENCE CHARACTERISTICS OF LIQUID DROPS ON TEXTURED SURFACES during the IHMTC-ASTFE conference at IIT Roorkee, December 2019.

vii. ONLY **KEYNOTE SPEAKER** from India in (once in four years) International Heat Transfer Conference held at Kyoto University, Kyoto, Japan (2014).

viii. Invited Lecture entitled FLOW AND TRANSPORT IN POROUS MEDIA WITH APPLICATIONS, presented on 19th March 2015 at *The Institute of Fluid Science,* Tohoku University, Japan.

ix. **KEYNOTE SPEAKER** at the Asian Society for Computational Heat Transfer and Fluid Flow, held at Busan, S. Korea during 22-25 November, 2015.

x. Awarded the **Institution Prize** of Institution of Engineers (India) for paper on enhanced oil recovery (1995).

xi. Awarded the M.G. Deshpande **Best Paper** Prize in the National Fluid Mechanics and Fluid Power Conference held at IIT Kharagpur, (1999).

xii. Received **letters of commendation** for excellent teaching from Director, IIT Kanpur for the following courses on over 20 occasions: Conduction and radiation, Experimental techniques in thermal sciences, Applied Numerical methods.

xiii. University of Delaware **Fellowship** holder during the entire Ph.D program (1981-1985).

xiv. Awarded Institute Medal and **Dr Sengupto** Prize for standing First in the Master's program at IIT Madras, India (1981).

xv. University rank holder of VRCE Nagpur and degree with **distinction** in the undergraduate program (1979).

PUBLISHED BOOKS

1. K. Muralidhar and T. Sundararajan, **Computational Fluid Flow and Heat Transfer**, published as a part of the IIT Kanpur Series (580 pages) by Narosa Publishers, New Delhi, Second edition (590 pages), July 2003, ISBN: 81-7319-522-6.
2. K. Muralidhar and G. Biswas, **Advanced Engineering Fluid Mechanics,** Narosa Publishers, third edition (630 pages), ISBN: 978-81-8487-385-6 (international: 978-1-84265-912-0) February 2015.
3. J. Banerjee and K. Muralidhar, **Czochralski Growth of Oxide Crystals: Numerical Simulation and Experiments,** Techscience Press, Georgia, USA, ISBN: 13-978-0-9717880-4-6, March 2007 (256 pages).
4. K. Muralidhar and J. Banerjee, **Conduction and Radiation**, Narosa Publishers, (479 pages), ISBN: 978-81-8487-080-0, February 2010.
5. P.K. Panigrahi and K. Muralidhar, **Schlieren and Shadowgraph Methods in Heat and Mass Transfer,** Springer Briefs in Thermal Engineering and Applied Science, Series New York, USA, (August, 2012) ISBN 978-1-4614-4534-0.
6. P.K. Panigrahi and K. Muralidhar, **Imaging Heat and Mass Transfer Processes - Visualization and Analysis,** Springer Briefs in Thermal Engineering and Applied Science, New York, USA, (October, 2012) ISBN 978-1-4614-4790-0.
7. Sameer Khandekar and K. Muralidhar, **Dropwise Condensation on Inclined Textured Surfaces,** Springer Briefs in Thermal Engineering and Applied Science, New York, USA, ISBN 978-1-4614-8446-2 (September 2013).
8. Malay K. Das, P.P. Mukherjee, and K. Muralidhar, **Modeling Transport Phenomena in Porous Media with Applications**, Springer, November 2017; ISBN 978-3-319-69866-3, (258 pages).
9. Sameer Khandekar and K. Muralidhar, **Drop Dynamics and Dropwise Condensation on Textured Surfaces**, ISBN 978-3-030-48460-6, Springer, 450 pages (May, 2020).
10. R. Narayanaswamy, M.K. Das., and K. Muralidhar, Sustainable Water Harvesting: Principles and Technologies, Springer (December 2025).

EDITED CONFERENCE PROCEEDINGS: 4

BOOK CHAPTERS: 20

PATENTS

International

*Enhancing blood flow images using computational fluid dynamics***,** jointly with ETH Zurich, WO 2010/022762 A3 (Granted November 2014; K. Muralidhar, G. Szekeley, D. Szczerba, and R. McGregor.

Indian

1. *Multi-drug delivery medical pump* design patent filed (May 2011, reference: 1557/DEL/2011); K. Muralidhar, A. Jain, R. Dwivedi, Rama Rao, P. Khanna, and Manoj Sharma (Granted August 2012).
2. *Non-invasive technique for evaluation of flow rates and identification of vascular deformation,* K. Muralidhar, Abhinav Parashar, Rahul Singh, Manoj Sharma, P. K. Panigrahi, patent filed (Granted August 2021; reference: PD008489-IN-SC 363/ DEL/ 2013).
3. *Water purification system using an enhanced solar still,* K. Muralidhar, A. Anand, A. Bhandari, S. Prakash, Manoj Sharma, Raj G. Pala (reference; 2894/DEL/2013) (Granted June 2021).
4. *Light streak imaging technique for determining mass diffusivity in a binary diffusion process*, K. Muralidhar, Y. Nimdeo, Subhajit Kar, Y.M. Joshi (patent filed; 904/DEL/2014) Patent No. 417935 granted on 13 January 2023.
5. *Unsteady wall heat flux sensor for extreme applications*, Ravindra Sonawane, S. Khandekar, K. Muralidhar (patent filed application number 3977/DEL/2014 dated 29 December 2014).
6. *Spherical tri-leaflet heart valve,* Kamal K. Kar, Malay Das, Sutapa Mandal, K. Muralidhar, reference 201711043075(Published June 2019).
7. *A printed circuit board-based electrowetting-on-dielectric (EWOD) medical diagnostic system,* Vandana Jain, K. Muralidhar, and Sameer Khandekar, application number 202111053889, Granted November 2022 (patent number 416498).
8. *VAD demonstrator system with mock circulatory loop for testing, demonstrating functions and performance of VAD*, Granted January 2024 (501166).
9. *Device and method for providing implantable mechanical circulatory support to augment cardiac output,* filed November 2025.
10. *Device and method for providing paracorporeal mechanical circulatory support in ventricular dysfunction*, filed November 2025.
11. *A hemophobic and antibacterial surface and a method of fabricating the same thereof,* Granted November 2025 (573934).

RECENT PUBLICATIONS

1. D. Chatterjee, U. Madanan, and K. Muralidhar, Enhanced Vapor Generation and Salt Mitigation in a Solar Evaporator using a Janus-type Hybrid Wick, Applied Thermal Engineering, Vol. 284, 129175 (2026).
2. Waquar Raza and K. Muralidhar, Real-time modeling of dropwise condensation of saturated water vapor on horizontal and vertical tubular surfaces, Int. J. Heat and Mass Transfer, Vol. 253, 127595 (2025).
3. Rishi Kumar, K. Muralidhar, and Indranil Saha Dalal, Effects of Geometric Modelling and Blood Rheology in Patient-Specific Arterial Blood Flow Simulations with Speed-Accuracy Trade-Off Analysis, accepted for publication in Journal of Non-Newtonian Fluid Mechanics (2025).
4. K. Muralidhar, N. Sinha, P.R. Joshi, A. Banyopadhyay, J.R. Rao, and K. Balani, Design and Development of a Left Ventricular Assist Device, in Technology and Innovation in Medical Sciences, a special issue of *Directions* (an IIT Kanpur publication), pp. 49-58, ISSN 2509-6591, November 2025.
5. C. Ramgopal, K. Muralidhar, and Virkeshwar Kumar, Drop spreading characteristics over a micro-pillared surface and comparison with an equivalent flat surface, Physics of Fluids 37, 062108 (2025).
6. M. Owais, A. Y. Usmani, and K. Muralidhar, Pulsatile flow hemodynamics in stenosed arterial curvatures, 10, 063101 Physical Review-Fluids (2025).
7. Manish Bhendura and K. Muralidhar, Effect of CO_2 on Evaporation Rate of Warm Water Enclosed in a Top-cooled Circular Cavity, Thermal Science and Engineering Progress, 62, 103620 (2025).

8. Raghvendra Dwivedi and K. Muralidhar, Dynamics of drop impact and contact line motion on micro-pillared surfaces, Physics of Fluids, 36, 122126 (2024).
9. Waquar Raza and K. Muralidhar, Time-resolved Modeling of Dropwise Condensation Patterns Formed on a Nanopillared Substrate, Int. J. Heat and Mass Transfer, Vol. 234, article number 126103 (2024).
10. S. Kataria, B.S. Sikarwar, P.S. Rathore, S. Upadhyay and K. Muralidhar, Metallic Hydrophobic Surfaces: Fabrication Methods and Applications in Water Vapor Condensation, International Communications in Heat and Mass Transfer, Vol. 159, article number 108306 (2024).
11. Gopinath Sahu, S. Khandekar, and K. Muralidhar, Effect of Nozzle Orifice Diameter and Position of Hydraulic Jump on Stagnation Point Heat Transfer During Liquid Jet Impingement Cooling, Journal of Flow Visualization and Image Processing 32(2):79–105 (2025).
12. K. Muralidhar, Modeling dropwise condensation over textured surfaces, article in THA FOCUS, Thermopedia, April 2024, DOI: 10.1615/thermopedia.010408 (5421 views till date)
13. Raghvendra K. Dwivedi and K. Muralidhar, Numerical simulation of drop spreading over a pillared surface, Journal of Flow Visualization and Image Processing**,** 31(3):1–20, (2024).
14. Vandana Jain and K. Muralidhar, Closed portable electrowetting-on-dielectric system for actuation of water droplets, Microsystem Technologies, Vol. 30, pp. 1485–1500, (2024).
15. Md. Owais, A. Usmani and K. Muralidhar, Effect of a bend on vortex formation and evolution in a three-dimensional stenosed geometry during pulsatile flow, Physics of Fluids, Vol. 35, 031906 (2023).
16. Supriya Upadhyay and K. Muralidhar, Continuous motion of an electrically actuated water droplet over a PDMS-coated Surface, Fluid Dynamics Research, 55 (2023) 055501 (2023).
17. Manish Bhendura, K. Muralidhar, and S. Khandekar, Influence of a Hydrophobic Membrane on Evaporation Rate of Water Placed in a Top-cooled Circular Cavity, Desalination, Vol. 268, 117037 (2023).
18. Supriya Upadhyay and K. Muralidhar, Effect of thermophysical and dielectric properties of a liquid droplet on continuous motion in an electric field, Interfacial Phenomena and Heat Transfer, Vol. 11(4), pp. 77–101 (2023).
19. Shubham Jain, Basant Sikarwar, and K. Muralidhar, Improved heat transfer modeling of moist air condensation on a hydrophobic metallic surface, Heat Transfer Engineering 45 (19), 1668-1686 (2024).
20. Pritam Giri, Indranil Saha-Dalal, and K. Muralidhar, Non-Newtonian blood flow with magnetic nanoparticles in a W-shaped stenosed arterial segment: A numerical study, Heat Transfer, Special issue on Modeling thermal transport through biological samples for therapeutic applications, Vol. 52, pp. 4962–4992, Wiley (2023).

21. Raghvendra K. Dwivedi and K. Muralidhar, Contact line dynamics of a water drop spreading over a textured surface in the electrowetting-on-dielectric configuration, Physical Review-E 106, 045111 (2022).
22. G.N. Sahu, K. Muralidhar, and S. Khandekar, Effect of Liquid Splattering on Thermal Performance of Jets and Sprays over Plain and Pillared surfaces, International Journal of Thermal Sciences, Vol. 187, 108131 (2023).
23. Raghvendra K. Dwivedi, Vandana Jain, and K. Muralidhar, Dynamic contact angle model for resolving low viscosity droplet oscillations during spreading over a surface with varying wettability, Physical Review-Fluids **7**, 034002 (2022).
24. Praveen M. Somwanshi, V. V. Cheverda, K. Muralidhar, S. Khandekar, and O. A. Kabov, Understanding Vertical Coalescence Dynamics of Liquid Drops over a Superhydrophobic Surface using High Speed Orthographic Visualization, Experiments in Fluids Vol. 63:47 (2022).
25. Manish Bhendura, K. Muralidhar, and S. Khandekar, Determination of Evaporation Rate of Warm Water Placed inside a Partially-filled Top Cooled Enclosure, International J. of Thermal Sciences, Vol. 179, 107612 (2022).
26. Vandana Jain, Raghvendra K. Dwivedi, and K. Muralidhar, Closed EWOD-Based Low-Cost Portable Thermal Detection System for Point-of-Care Applications, Sensors and Actuators A (Physical) 113831 (2022).
27. Punj Lata Singh, B.S. Sikarwar, M. Ranjan and K. Muralidhar, Enhancing Hydrophobicity of Copper Substrate by Temperature-Controlled Chemical Etching for Dropwise Condensation of Vapor from Moist Air, Thermal Science and Engineering Progress Vol. 34, 101403, (2022).
28. Manish Bhendura, K. Muralidhar, and S. Khandekar, An Improved Correlation of Evaporation Rate of a Water Pool derived using Combined ANN-GA, Computational Thermal Sciences, 15(2):1–19 (2023).
29. G.N. Sahu, K. Muralidhar, and S. Khandekar, Thermal Characterization of Spray Impingement Heat Transfer over a High-Power LED Module, Thermal Science and Engineering Progress Vol. 32, 101333, (2022).
30. Pritam Giri, Krishna Chandran, K. Muralidhar, and Indranil Saha Dalal, Effects of coupling of mass transport and blood viscosity models for microchannel flows, Journal of Non-Newtonian Fluid Mechanics 302:104754 (2022).
31. D. K. Sharma, Basant S. Sikarwar, S. Upadhyay, Ranjit Kumar, D.K. Avasthi, Mukesh Ranjan, S.K. Srivastava, and K. Muralidhar, Super-hydrophobic Nanostructured Silica-Coating on Aluminum Substrate for Moist Air Condensation, Journal of Materials Engineering and Performance (August 2021) Vol. 31, 1266-1276.
32. Abdullah Usmani and K. Muralidhar, Unsteady hemodynamics in intracranial aneurysms with varying dome orientations, ASME J. Fluids Engg., Vol. 143, 061206 (1-14) (2021).

33. Praveen Somwanshi, K. Muralidhar, and Sameer Khandekar, Coalescence of Vertically Aligned Drops over a Superhydrophobic Surface**,** Physics of Fluids, Vol. 32, 052106 (2020).
34. Krishna Chandran and K. Muralidhar, A switching ILU(0)-SGS preconditioner for matrix systems of incompressible flow and heat transfer using condition number estimates, Progress in Computational Fluid Dynamics, Vol. 20(6), pp. 315-332 (2020).
35. Raghvendra Pratap Singh, Rahul Yadav, K. Muralidhar and Malay K. Das, Effect of confined boundary and mud-layers on depressurization-based gas recovery and land subsidence in hydrate reservoirs, Marine Georesources and Marine Geotechnology, Vol. 40:1, 78-95, (2022).
36. Pawan Kumar Pandey, Chandan Paul, Malay Das, and K. Muralidhar, Assessment and visualization of hemodynamic loading in aneurysm sac and neck: effect of foam insertion, Journal of Engineering in Medicine (Part H) Vol. 235(8) pp. 927-939 (2021).
37. Krishna Chandran, Indranil Saha Dalal, Kazuya Tatsumi, and K. Muralidhar, Numerical simulation of blood flow modeled as a fluid- particulate mixture, Journal of Non-Newtonian Fluid Mechanics, 104383, Vol. 285, 15 pages (2020).
38. Raghvendra Pratap Singh, Karanpal Singh Shekhawat, Malay K. Das and K. Muralidhar, Geological Sequestration of CO_2 in a Water-Bearing Reservoir in Hydrate-Forming Conditions, Oil & Gas Science and Technology-RRevue d'IFP Energies nouvelles, Vol. 75(5), p. 51 (January 2020).
39. Sameer Khandekar, Gopinath Sahu, K. Muralidhar, Elizaveta Ya. Gatapova, Oleg A. Kabov, Run Hu, Xiaobing Luo, Liang Zhao, Cooling of High-Power LEDs by Liquid Sprays: Challenges and Prospects, Applied Thermal Engineering Vol. 184, pp. 115640, (2021).
40. V. Baghel, B.S. Sikarwar, K. Muralidhar, Dropwise Condensation from Moist Air over a Vertical Hydrophobic Metallic Substrate, Applied Thermal Engineering Vol. 181, 115733 (17 pages) (2020).
41. Praveen M. Somwanshi, K. Muralidhar, Sameer Khandekar, and Cheverda Vyacheslav, Mixing and Wall Heat Transfer during Vertical Coalescence of Drops placed over a Superhydrophobic Surface, 8(3):207–224 Interfacial Phenomena and Heat Transfer (2020).
42. Vandana Jain and K. Muralidhar, Electrowetting-on-Dielectric System for COVID-19 Testing, Transactions of the Indian National Academy of Engineering, Vol. 5, pp. 251-254, (2020).
43. Raghvendra Pratap Singh, Saurav Parashar, K. Muralidhar and Malay K. Das, Recovery of Methane from a Gas Hydrate Reservoir using depressurization and N_2 injection, Special Topics and Reviews in Porous Media, Vol. 12(1), pp. 53-71 (2021).
44. Ganesh Shirsath, K. Muralidhar and Raj G. S. Pala Variable Air Gap Membrane Distillation for Hybrid Solar Desalination, Journal of Environmental Chemical Engineering, Vol. 8, 103751, 13 pages (2020).

45. Praveen Somwanshi, K. Muralidhar, and Sameer Khandekar, Coalescence Dynamics of Sessile and Pendant Liquid Drops Placed on a Hydrophobic Surface, Physics of Fluids, Vol. 30, 092103, 15 pages (2018).
46. Arshad Afzal, Hyung Hee Cho, Heeyon Chung, K Muralidhar, Neural-network-assisted optimization of rectangular channels with intersecting ribs for enhanced thermal performance, Heat Transfer Engineering, Vol. 41(20), pp. 1609-1625, 2020.
47. Ganesh Shirsath, Raj G. S. Pala, J. Ramkumar, and K. Muralidhar, Condensation of Water Vapor underneath an inclined Hydrophobic Textured Surface Machined by Laser and Electric Discharge, Applied Surface Science, Vol. 484, pp. 999-1009 (2019).
48. V. Baghel, B.S. Sikarwar, K. Muralidhar, Modeling of heat transfer through a liquid droplet, Heat and Mass Transfer, Vol. 55 (5), pp. 1371-1385, 2019.
49. Ganesh Shirsath, Raj Pala, K. Muralidhar, and S. Khandekar, Effect of salinity and water depth on the performance of doubly inclined solar still, Desalination and Water Treatment, Vol. 124, pp. 72-87 (2018).
50. Praveen Somwanshi, K. Muralidhar, and Sameer Khandekar, Dropwise Condensation Patterns of Bismuth Formed on Horizontal and Vertical Surfaces, Int. J. Heat and Mass Transfer, Vol. 122, pp. 1024-1039 (2018).
51. Krishna Chandran and K. Muralidhar, Condition Number Analysis of Flow Fields arising from CFD Simulations, International Journal of Advances in Engineering Sciences and Applied Mathematics (Special issue on Computational Heat Transfer and Fluid Dynamics) Vol. 10(4):238–251 (2018).
52. Aashutosh Mistry and K. Muralidhar, Spreading of a pendant liquid drop underneath a textured substrate, Physics of Fluids, Vol. 30(4), paper number 042104, 18 pages (2018).
53. Abdullah Usmani and K. Muralidhar, Flow in an Intracranial Aneurysm Model: Effect of Parent Artery Orientation, Journal of Visualization, Vol. 21(5), pp. 795-721 (2018).
54. Abdullah Usmani and K. Muralidhar, Pulsatile flow in a compliant stenosed asymmetric model, Experiments in Fluids, Vol. 57:186, pp. 1-24 (2016).
55. Shivam Patel, A. Usmani and K. Muralidhar, Effect of aorto-iliac bifurcation and iliac stenosis on flow dynamics in an abdominal aortic aneurysm, Fluid Dynamics Research, Vol. 49, 035513 (2017).
56. Samarjeet Chanda and K. Muralidhar, Joint estimation of thermal and mass diffusivities of a solute-solvent system using ANN-GA based inverse framework, International J. Thermal Sciences, Vol. 123, pp. 27-41 (2018).
57. Sachin K. Singh, Mohit Gogna, K. Muralidhar and Sameer Khandekar, Combined effect of substrate wettability and thermal properties on evaporation dynamics of a sessile droplet, Interfacial Phenomena and Heat Transfer, Vol. 5, pp. 321-335, (2017).
58. Y. Nimdeo, Y.M. Joshi, and K. Muralidhar, Diffusion of charged nano-disks in aqueous media: Influence of competing inter-particle interactions and thermal effects, Chemical Engineering Science, Volume 164, pp. 71–80 (2017).
59. Trushar Gohil, A.K. Saha, and K. Muralidhar, Simulation of Blooming Phenomenon in Forced Circular Jets, J. Fluid Mechanics, Vol. 783, pp. 567-604 (2015).

60. Usmani and K. Muralidhar, Oscillatory flow in an enlarged compliant vasculature, Biomedical Physics & Engineering Express, Vol. 2, paper 025016 (17 pages) (2016).
61. M.G. Visakh, A.K. Saha, and K. Muralidhar, Effect of spanwise shear on flow past a square cylinder at intermediate Reynolds numbers, Physics of Fluids, Vol. 28, 033602, 31 pages (2016).
62. Y. Nimdeo, Y.M. Joshi, and K. Muralidhar, Refractive Index Measurement of Sol Forming Laponite JS Dispersion Using Interferometry, Vol. 123, pp. 273-278, Applied Clay Science (2016).
63. Sachin K. Singh, Mahesh Yadav, S. Khandekar, and K. Muralidhar, Estimation of time-dependent wall heat flux from single thermocouple data, International Journal of Thermal Sciences, Vol. 115, pp. 1-15 (2017).
64. M. R. Gunjan, P. Somwanshi, Ayush Agarwal, S. Khandekar and K. Muralidhar, Recoil of drops during coalescence on super-hydrophobic surfaces, Interfacial Phenomena and Heat transfer, Vol. 3 (2), pp. 1–18 (2015).
65. B.S. Sikarwar, K. Muralidhar and S. Khandekar, Dropwise condensation of metal vapour underneath inclined textured substrates, Interfacial Phenomena and Heat transfer (Kutataladze special issue) Vol. 3(1), pp. 85-113 (2015).
66. Aashutosh Mistry and K. Muralidhar, Axisymmetric model of drop spreading on a horizontal surface, Physics of Fluids, Vol. 27, 092103, 26 pages (2015).
67. S.K. Biswal, P.K. Mohapatra, and K. Muralidhar, Transitional flow in a right-angled compound open canal junction, Irrigation and Drainage 65:73–84, (2016).
68. S.K. Biswal, P.K. Mohapatra, and K. Muralidhar, Hydraulics of combining flow in a right-angled open channel junction, Sadhana Vol. 41(1), pp. 97–110 (2016).
69. K. Muralidhar and Malay K. Das, Hydrate Reservoirs – Methane Recovery and CO_2 Disposal, Proceedings of the Indian National Science Academy, special issue on Energy, Vol. 81(4), pp. 787-800, edited by Baldev Raj, Kamachi Mudali, and I. Manna (2015).
70. K. Muralidhar, Life with Experiments, in *The Mind of an Engineer;* a publication of INAE, pp. 359-361, Springer, edited by P. Ghosh and Baldev Raj (2015).
71. Y. Rathee, B.R. Vinoth, P.K. Panigrahi, and K. Muralidhar, Imaging flow during the impingement of differentially heated jets over a flat surface, Nuclear Engineering and Design, Vol. 294 pp. 1-15, December (2015).
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73. Trushar Gohil, A.K. Saha, and K. Muralidhar, Large eddy simulation of a free circular jet, ASME J. Fluids Engg., Vol. 136, 051205-1 to -14 (2014).
74. Y. Nimdeo, Y.M. Joshi, and K. Muralidhar, Measurement of mass diffusivity using interferometry through sensitivity Analysis, Industrial and Engineering Chemistry Research, Vol. 53, pp. 19338−19350 (2014).
75. Kathrin Burkhardt, Dominik Szczerba, Esra Neufeld, K. Muralidhar, Niels Kuster, Parallel smoothing pressure correction solver for biomedical flow problems: Convergence

criteria, preconditioning, scalability, Progress in Computational Fluid Dynamics, Vol. 16(4), pp. 201-215 (2016).

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78. Chandan Paul, M.K. Das, and K. Muralidhar, Three-dimensional simulation of pulsatile flow through a porous bulge, Transport in Porous Media, Vol. 107(3), pp. 843-870 (2015).
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80. Trushar Gohil, A.K. Saha, and K. Muralidhar, Direct numerical simulation of forced circular jets: effect of varicose perturbation, International Journal of Heat and Fluid Flow, Vol. 44, pp. 524-541 (2013).
81. B.S. Sikarwar, K. Muralidhar, and S. Khandekar, Effect of drop shape on heat transfer during dropwise condensation underneath inclined surfaces, Interfacial Phenomena and Heat transfer, Vol. 1(4), pp. 339-356 (2013).
82. S.S. Bhandari, K. Muralidhar, and Y.M. Joshi, Thermal diffusivity and viscosity of suspensions of disc-shaped particles, Industrial and Engineering Chemistry Research, Vol. 52, 15114−15123, (2013).
83. Gaurav Bhutani, K. Muralidhar, Sameer Khandekar, Determination of apparent contact angle and shape of a static pendant drop on a physically textured inclined surface, Interfacial Phenomena and Heat Transfer, Vol. 1 (1), pp. 29–49 (2013).
84. Abhishek Khetan, Malay K. Das, and K. Muralidhar, Analysis of Methane Production from a Porous Reservoir via Simultaneous Depressurization and CO_2 Sequestration, Special Topics and Reviews in Porous Media, Vol. 4(3), pp. 237-252 (2013).
85. Abhinav Parashar, Rahul Singh, P.K. Panigrahi, and K. Muralidhar, Chaotic flow in an aortic aneurysm, Journal of Applied Physics, Vol. 113, pp. 214909 (1-14), (2013).
86. Anamika S. Gupta, Rajive Gupta, P.K. Panigrahi, and K. Muralidhar, Imaging transport phenomena during lysozyme protein crystal growth by the hanging drop technique, Journal of Crystal Growth, Vol. 372, pp. 19-33 (2013).
87. Basant S. Sikarwar, S. Khandekar, and K. Muralidhar, Simulation of flow and heat transfer in a drop sliding underneath a hydrophobic surface, International Journal of Heat and Mass Transfer, Vol. 57, pp. 786-811, (2013).
88. Basant S. Sikarwar, S. Khandekar, and K. Muralidhar, Mathematical Modeling of Dropwise Condensation on Textured Surfaces, Sadhana (Springer), Vol. 38(6), pp. 1-37, 2013.

Postdoctoral Fellows

a) Samarjeet Chanda (2015-2018), Surrogate modeling for property and boundary condition estimation in an inverse technique framework.

b) Arshad Afzal (INSPIRE) (2016-2020), Optimization of rib geometry for gas turbine blade cooling.

c) Vandana Jain (June 2019 - July 2022), Dynamics of electrically actuated liquid droplets.

d) Pritam Giri (August 2020 – April 2022), Blood rheology and fluid-structure interaction.

e) Digamber Singh (January 2022 – June 2023), Full body patient-specific simulation of an arterial network

f) Supriya Das (2022-) , Mandeep Singh (2022-2024), Akshay Namdeo (2023-), Vinay Tripathi, (2023-) M. Owais (2024-), Design and development of a new generation left ventricular assist device

g) Debartha Chatterjee (December 2024), Solar desalination using interfacial heating

PhDs guided

i. P.M.V. Subbarao, Experimental study of the effect of stable thermal stratification on a class of turbulent shear flows, (1995).

ii. Debasish Mishra, Experimental study of Rayleigh-Benard convection using interferometric tomography, (1998).

iii. Arun K. Saha, Dyamical Characteristics of the wake of a square cylinder at low and high Reynolds numbers, (1999).

iv. Tanuja Sheorey, Numerical modeling of enhanced oil recovery from porous and fractured formations on parallel computers, (2001).

v. Sunil Punjabi, Interferometric Study of Convection in Superposed Gas-Liquid Layers, (2002).

vi. Andallib Tariq, Heat transfer enhancement and fluid flow behind surface mounted solid and permeable ribs (2004).

vii. Jyotirmay Banerjee, Modeling of the Czochralski crystal growth process, role of magnetic fields and influence on the thermo-mechanical properties, (2004).

viii. Atul Srivastava, Optical imaging of convection around a KDP crystal growing from its aqueous solution, 2006.

ix. Sushanta Dutta, Structure of flow and the turbulent field over ribbed surfaces, (2006).

x. Chanpreet Singh, Unsteady convective heat transfer in liquid saturated and unsaturated porous media with reference to an energy storage system (2007).

xi. Sunil Verma, Convection, concentration, and surface feature analysis during crystal growth from solution using shadowgraphy, interferometry, and tomography (2008).

xii. Robert H.P. McGregor, Enhancing medical images with high quality blood flow information (2010), degree submitted at ETH Zurich.

xiii. Trushar Gohil, Flow control using three dimensional perturbed jets (2011).

xiv. Anamika Sethia-Gupta, Optical visualization of protein crystal growth (2012).

xv. Sushanta Biswal, Open channel junction flows in simple and compound channels in the transcritical regime (2012).

xvi. Basant S. Sikarwar, Motion of droplets on physically and chemically textured surfaces (2012).

xvii. S.K. Bhandari, Transport phenomena in aging gels and colloidal glasses (June, 2013).

xviii. Yogesh Nimdeo, Mass diffusivity of solutions and sol/gel forming colloidal suspensions (2016).

xix. Narendra Gajbhiye, Numerical Simulation of Magnetohydrodynamics Flow and Heat Transfer in Enclosures and Ducts (2016).

xx. Praveen Somwanshi, Three dimensional imaging of coalescence dynamics of drops underneath textured surfaces (2018).

xxi. Abdullah Usmani, Imaging oscillatory flow in deforming arterial bifurcations (January 2018).

xxii. Ganesh Shirsath, Design and performance of an improved solar still using membranes (2018).

xxiii. Krishna Chandran, Accelerators for linear solvers in three dimensional CFD Simulation for Biomedical Applications (2020).

xxiv. Vishakha Baghel, Modeling of moist air condensation underneath engineered surfaces, (November, 2020).

xxv. Raghavendra Pratap Singh, Analysis of methane recovery techniques and CO_2 sequestration in the K-G basin (2020).

xxvi. Supriya Upadhyay, Electrically-driven continuous motion of a liquid drop on a PDMS-coated electrode (September, 2022).

xxvii. Mohammad Owais, Pulsatile flow hemodynamics of arterial bends manifesting stenosis (September, 2024).

xxviii. Manish Bhendura, Convection-Assisted Interfacial Evaporation in an Air-Water System: Experimental and Numerical Study (December, 2023).

xxix. Gopinath Sahu, Thermal Management of High-Power Devices by Liquid Jets and Sprays (September, 2023).

xxx. Raghavendra Dwivedi, Contact line dynamics of drop spreading and impact over textured surfaces (October 2024).

xxxi. Debartha Chatterjee, Design of a Decoupled Evaporator for Reliable and Efficient Vapor Generation for Thermal-Desalination Application (May 2025).

xxxii. Waquar Raza, Dropwise condensation of moist air over tubular surfaces (December 2025).

xxxiii. C. Ramgopal, Drop dynamics and dropwise condensation over pillared surfaces (in progress).

xxxiv. Rishi Kumar, Diffusive flux modeling of blood rheology in a full body arterial network (in progress).

xxxv. Sohom Goswami, Laboratory-scale studies in fog harvesting (in progress).

xxxvi. Tarun Kulshreshta, Solar thermal water purification system (in progress).

VISUAL AND WEB-BASED COURSE CONTENT

1. Educational film entitled **Hot-Wire Anemometry,** 1993 (39 minutes).
2. **Optical Measurement Techniques in Thermal Sciences**, web-course prepared under the NPTEL program, April 2012 (http://www.nptel.iitm.ac.in/courses/112104039/).
3. **An educational website for interferometry,** developed as an MHRD project (2010-2012); http://202.3.77.50/~opticalv/interferometry/.
4. **Introduction to Fluid Mechanics,** a series of 37 lectures available on YouTube (2017)**.**

REVIEW ARTICLES

1. K. Muralidhar, **Imaging unsteady three dimensional transport phenomena**, Pramana (J. Phys.), Vol. 82(1), (invited article) pp. 3-14, 2014.
2. Atul Srivastava, K. Muralidhar, and P.K. Panigrahi, **Optical Imaging and Three Dimensional Reconstruction of the Concentration Field around a Crystal growing from Aqueous Solution: A Review,** Progress in Crystal Growth and Characterization of Materials, Vol. 58, pp. 209-278, (2012).
3. S. Verma and K. Muralidhar, **Imaging convection, concentration, and surface morphology during crystal growth from solution using optical diagnostics**, in *Recent Research Developments in Crystal Growth*, Vol. 5 (2009), pp. 141-314, Transworld Research Network, India, ISBN: 978-81-7895-198-0.

4. K. Muralidhar, Atul Srivastava and P.K. Panigrahi, **Optical Imaging and Control of Convection around a Crystal growing from its Aqueous Solution** in *New Developments in Crystal Growth Research,* [ISBN: 1-59454-539-1] pp 1-89, Nova Publishers, USA, 2005.
5. K. Muralidhar, **Temperature Field Measurement in Buoyancy-driven Flows using Interferometric Tomography**, Annual Review of Heat Transfer, Vol. 12, pp. 265-376, 2001.
6. M.F. Manzoor, P. Yadav, K. Muralidhar and P. Munshi, **Image Reconstruction of Simulated Specimens using Convoluted Back Projection for Computerized Tomography**, Defence Science Journal, Vol. 51(2), pp 175-187, 2001.
7. K. Muralidhar, **A Review of Free, Forced and Mixed Convection in a Saturated Porous Annulus**, Sadhana, Vol. 15, pp 1-41, 1990.

EDITORIALS

1. Foreword, INTRODUCTION TO COMPUTATIONAL FLUID DYNAMICS: DEVELOPMENT, APPLICATION, ANALYSIS, Atul Sharma, Springer (2022).
2. Editorial, NUMERICAL FLOW VISUALIZATION: FROM THE PERSPECTIVES OF COMPUTER GRAPHICS AND MACHINE LEARNING, *Journal of Flow Visualization & Image Processing* 29(3):v–vi (2022).
3. Editorial, VISUALIZATION OF COMPLEX FLOW STRUCTURES IN JETS AND WAKES, *Journal of Flow Visualization & Image Processing* 29(4):v–vi (2022).

CENTRALLY COORDINATED PROJECTS

1. PROGRAM FOR DEVELOPING A HIGH-END AND AFFORDABLE LEFT VENTRICULAR ASSIST DEVICE, supported by various donors as well as IIT Kanpur (2022 onward).
2. LEADERSHIP FOR ACADEMICIANS PROGRAM, supported by MHRD, New Delhi (2018-2019).
3. GENERATION, DISTRIBUTION AND STORAGE OF SOLAR HYDROGEN, supported by the Technology Systems Development Program of DST, New Delhi for an amount of Rs. 8 crores (March 2012-December 2014).
4. INTERNET-BASED EXPERIMENTS, supported by MHRD, New Delhi (2009-2015).
5. DEVELOPMENT OF A GENERAL PURPOSE CFD CODE, Board of Research in Nuclear Sciences, Mumbai (2005-2010), Rs 3.2 crores, ; with V. Eswaran.
6. DEVELOPMENT OF A GENERAL PURPOSE CFD SOLVER OVER A HYBRID UNSTRUCTURED GRID, Department of Atomic Energy, Mumbai (2013-2016); with Amaresh Dalal (IIT Guwahati) and V. Eswaran (IIT Hyderabad).

7. FUTURISTIC MECHANICS RELATED TO FAST BREEDER REACTORS, supported by IGCAR Kalpakkam (phase I, 2009-2013; phase II, 2014 onwards).
8. MICROSCALE ENGINEERING, NON-INVASIVE MEASUREMENTS, NEW-ERA MACHINES and ENERGY, equipment grant of Rs 9.6 crores under the FIST scheme of Department of Science and Technology, New Delhi (2006).

SPONSORED PROJECTS

1. DROPWISE CONDENSATION OF WATER VAPOUR OVER PILLARED SURFACES, ANRD-SERB, New Delhi (2022-2025).
2. FOG HARVESTING FOR WATER: EXPLORING DROPLET CONDENSATION ON MESH-TYPE SURFACES, SPARC PROGRAM OF MoE (2023-2025).
3. FULL-BODY SIMULATIONS OF BLOOD FLOW: REALISTIC COMPUTATIONS IN THE ARTERY NETWORK SPANNING THE ENTIRE HUMAN BODY, National Supercomputing Mission (DST) (2021-2023).
4. THERMO-HYDRODYNAMICS OF MICRO-DROPLETS INTERACTING WITH ENGINEERED SURFACES, INDO-RUSSIAN DST project (2018-2020).
5. ESTIMATION OF TRANSPORT PROPERTIES OF BLOOD MODELED AS A FLUID-PARTICULATE MIXTURE FROM EXPERIMENTAL AND THEORETICAL APPROACHES, Department of Science and Technology, New Delhi (2017-2019).
6. MODELING AND SIMULATION OF METHANE EXTRACTION FROM GAS HYDRATES VIA SIMULTANEOUS DEPRESSURIZATION AND CO_2 INJECTION, National Gas Hydrates Program (coordinated by ONGC Dehradun) (2014-2017.
7. STATICS AND DYNAMICS OF MICRO DROPLETS FORMED ON TEXTURED SURFACES DURING CONDENSATION, Board of Research in Nuclear Sciences, Department of Atomic Energy, Mumbai (2012-2015).
8. A PREDICTIVE MODEL OF ANEURYSM DEVELOPMENT IN AN ARTERIAL BIFURCATION, Department of Biotechnology, New Delhi (2010-2013.
9. OPTICAL VISUALIZATION OF HEAT TRANSFER AND FLUID FLOW PHENOMENA, supported as a part of the *Internet-based experiments* project of MHRD, New Delhi (2010-2012).
10. QUANTITATIVE ANALYSIS OF *IN VIVO* MAGNETIC RESONANCE IMAGING DATA FOR DIAGNOSTICS OF VASCULAR DISEASES SUPPORTED BY CFD SIMULATION, Indo-Swiss project supported by Department of Science and Technology, New Delhi, (2006-2008).
11. EXPERIMENTS IN ACTIVE CONTROL OF BLUFF BODY DRAG USING SCHLIEREN VELOCIMETRY TECHNIQUE, ER and IPR (DRDO), New Delhi (2005-2008).
12. OPTICAL VISUALIZATION OF PROTEIN CRYSTAL GROWTH, Department of Science and Technology, New Delhi (2005-2008).

13. DROPWISE CONDENSATION AND HEAT TRANSFER ON AN INCLINED SURFACE EXPOSED TO A VAPOR FLUX, Department of Atomic Energy, Mumbai (2005-2009).
14. RAINBOW SCHLIEREN TOMOGRAPHIC MEASUREMENTS DURING COMBUSTION OF GASEOUS FUELS SUCH AS HYDROGEN, MHRD (thrust area project) (2003-2004).
15. EXPERIMENTAL STUDY OF HEAT TRANSFER ENHANCEMENT IN VORTEX DOMINATED FLOWS USING LIQUID CRYSTAL THERMOGRAPHY, ARDB New Delhi (2002-2003).
16. BEAM HARDENING AND PHOTON STATISTICS, DRDL Hyderabad (2001-2002).
17. LASER INTERFEROMETRIC STUDY OF SOLUTAL TRANSPORT AND KINETICS OF CRYSTAL GROWTH IN AN AQUEOUS SOLUTION, Department of Science and Technology, New Delhi, (2000-2003).
18. INTERFEROMETRIC STUDY OF BUOYANCY-DRIVEN CONVECTION AND INTERFACIAL TRANSPORT IN SUPERPOSED HORIZONTAL FLUID LAYERS, Department of Science and Technology, New Delhi (2001-2004).
19. MATHEMATICAL MODELING OF THE CVD AND CZOCHRALSKI CRYSTAL GROWTH SYSTEMS, ROLE OF MAGNETIC FIELDS AND THEIR EFFECT ON THE THERMOMECHANICAL PROPERTIES, Department of Atomic Energy, Mumbai (2000-2003).
20. MODELING AND SIMULATION OF ENHANCED OIL RECOVERY FROM POROUS AND FRACTURED FORMATIONS, Oil Industry Development Board, N. Delhi, (1998-2001).
21. UNSTEADY SEPARATED FLOW IN THE WAKE OF A SQUARE CYLINDER IN A CHANNEL: NUMERICAL AND EXPERIMENTAL STUDY, Aeronautics Research and Development Board (Aerodynamics panel), New Delhi (1998-2001).
22. NUMERICAL SIMULATION OF ENHANCED OIL RECOVERY ON PARALLEL COMPUTERS, Department of Science and Technology New Delhi, (1997- 2000).
23. NOISE REMOVAL, THREE DIMENSIONAL RECONSTRUCTION AND DATA RETRIEVAL FOR OPTICAL IMAGES OF STRATIFIED FLUIDS, Department of Science and Technology, New Delhi (1994 -1997).
24. LABORATORY MEASUREMENTS OF HEAT AND MASS TRANSFER COEFFICIENTS IN FRACTURED AND POROUS MEDIA, Department of Atomic Energy, Mumbai (1992-1995).
25. EXPERIMENTAL AND THEORETICAL STUDY OF FREE, FORCED AND MIXED CONVECTIVE COOLING OF ELECTRONIC EQUIPMENT, Department of Science and Technology, New Delhi (1991-1994).
26. NUMERICAL SOLUTION OF CONVECTION-DIFFUSION PROBLEMS WITHOUT USING UPWIND METHOD, Department of Science and Technology, New Delhi (1990-1993).

27. STUDY OF FLOW, HEAT AND MASS TRANSFER FROM BURIED NUCLEAR WASTE CANISTERS, Department of Atomic Energy, Mumbai (1989-1992).
28. LABORATORY STUDIES OF FREE STREAM TURBULENCE IN STRATIFIED SHEAR FLOWS USING HOT-WIRE ANEMOMETRY Aeronautics Research and Development Board, New Delhi (1989-1991).

SPONSORED PROJECTS (Co-investigator**)**

1. FIXED-WING LOW ALTITUDE LONG ENDURANCE UNMANNED AERIAL SYSTEM AS RESEARCH PLATFORM, RCOEM and Solar Industries, Nagpur (2023-2024); (PI: D. Philip).
2. ZERO-E AIRCRAFT HEAT TRANSFER LOOP USING SUPERCRITICAL FLUID FOR HYDROGEN CONDITIONING, Airbus Industries (2024-2026); (PI: U. Madanan)
3. ENGINEERING FIBERS FOR FOG HARVESTING AND INTERFACIAL SOLAR WATER PURIFICATION, National Technical Textile Mission (Ministry of Textiles), 2021-2023 (PI: Sameer Khandekar).
4. DEVELOPMENT OF HIGH-PERFORMANCE COOLING SYSTEMS FOR HIGH POWER ELECTRONICS, LED AND ACCELERATED LIFE CYCLE MODELS, BRICS DST project (2018-2020) (PI: Sameer Khandekar).
5. LOCAL HEAT TRANSFER COEFFICIENT DURING FILM CONDENSATION OF STEAM-HYDROGEN MIXTURES IN UPWARD AND DOWNWARD FLOW CONFIGURATIONS FOR CONTAINMENT APPLICATION, Board of Research in Nuclear Sciences, Mumbai (2015-2017) (PI: Sameer Khandekar).
6. CO_2 SEQUESTRATION IN MARINE HYDRATE SEDIMENTS WITH SIMULTANEOUS CH_4 RECOVERY, Department of Science and Technology, New Delhi (2014-2015), with Malay K. Das.
7. SYNTHETIC JET ACTUATORS FOR DRAG REDUCTION OF UNDERWATER VEHICLES, Naval Research Board, New Delhi (2012-2014), with A.K. Saha.
8. UNDERSTANDING TRANSPORT OF ENERGY AND MASS IN JAMMED SOFT MATERIALS USING LASER INTERFEROMETRY, Department of Science and Technology, New Delhi (2011-2014); with Y.M. Joshi.
9. THERMAL STRIPING STUDY IN A FAST BREEDER REACTOR: EDDIES TRANSPORT USING COMBINED PIV/LIF AND SCHLIEREN TECHNIQUE, IGCAR Kalpakkam (2010-2012); with P.K. Panigrahi.
10. LASER HEATED PEDESTAL GROWTH OF CRYSTALLINE RF3+:YAG FOR DOSIMETRY, Board of Research in Nuclear Sciences, Mumbai (2006-2008), with Bansi Lal.
11. SYNTHETIC JETS FOR PROPULSION AND MANEUVERING OF UNDERWATER VEHICLES, Naval Research Board, New Delhi (2007-2008); with A.K. Saha.
12. ACTIVE FLOW CONTROL BY DYNAMIC OBSTACLES IN PROPULSION APPLICATIONS, Naval Research Board, New Delhi (2004-2006); with A.K. Saha.
13. EXPERIMENTAL STUDY OF HEAT TRANSFER ENHANCEMENT IN VORTEX DOMINATED FLOW USING LIQUID CRYSTAL THERMOGRAPHY, ARDB, New Delhi (2002-2003).

14. SCHLIEREN MEASUREMENTS OF UNSTEADY HEAT AND MASS TRANSFER FROM BLUFF OBJECTS, UP Science and Technology, Lucknow (1999-2001) with P.K. Panigrahi.
15. A GENERAL PARALLEL MATRIX INVERTER FOR CFD APPLICATIONS, Department of Science and Technology, New Delhi (1998-2001); with V. Eswaran.
16. UNSTEADY SEPARATED FLOW IN THE WAKE OF A SQUARE CYLINDER IN A CHANNEL: NUMERICAL AND EXPERIMENTAL STUDY, Aeronautics Research and Development Board (Aerodynamics panel) (1998-2001); with G. Biswas.
17. FAST SEARCH ALGORITHMS AND THEIR IMPLEMENTATION ON PARALLEL COMPUTERS, Department of Science and Technology, New Delhi (1997-2000); with K. Deb.
18. FAULT DIAGNOSIS OF PRESSURIZED HEAVY WATER REACTORS USING NEURAL NETWORKS: IDENTIFICATION OF SOME TRANSIENTS, Board of Research in Nuclear Sciences, Mumbai (1997-2000); with K. Deb.
19. NUMERICAL SIMULATION OF UNSTEADY THREE DIMENSIONAL FLOW AROUND A BODY MOVING IN AN INCOMPRESSIBLE FLUID ON A PARALLEL COMPUTER, Defence Research and Development Laboratory, Hyderabad (1995-1996); with V. Eswaran.

CONSULTANCY PROJECTS: 10

CONFERENCES AND SHORT-TERM COURSES ORGANIZED: 20

SELECTED INVITED TALKS (since 2000)

1. OPTICAL MEASUREMENT TECHNIQUES FOR FLUID FLOW AND HEAT TRANSFER, Proceedings of the 16th National Convention of Mechanical Engineers, University of Roorkee, September 2000.
2. THERMAL CONDUCTIVITY OF A HETEROGENEOUS MEDIUM, Indo-German Workshop on High-temperature Fiber Composite Materials, Banaras Hindu University, September 2000.
3. ESTIMATION OF THERMAL CONDUCTIVITY OF HETEROGENEOUS MATERIALS BY AN INVERSE TECHNIQUE, CEP course on Spectroscopic and Thermal Techniques for materials characterization, organized by DMSRDE Kanpur, November 2000.
4. MODELING AND SIMULATION OF TRANSPORT PROCESSES DURING CRYSTAL GROWTH, Center of Advanced Technology, Indore, November 2000.
5. PARAMETER ESTIMATION IN NONLINEAR DIFFUSION PROBLEMS BY AN INVERSE TECHNIQUE, 27th National Fluid Mechanics and Fluid Power Conference held at FCRI, Palghat, December 2000.
6. MODELING OF IMMISCIBLE DISPLACEMENT DURING ENHANCED OIL RECOVERY FROM A POROUS FORMATION, National Conference on Mathematical and Computational Models, held at PSG College of Technology, Coimbatore, pp 15-20, December 2001.

7. LASER-BASED MEASUREMENT OF TEMPERATURE IN FLUIDS, Short term course on *Wind Tunnel Testing,* IIT Kanpur, 11-15 February 2002.
8. CONVECTION IN DIFFERENTIALLY HEATED FLUID LAYERS, presented at the International Conference on Fluid Mechanics and Fluid Power as a PLENARY LECTURE at IIT Roorkee, December 2002.
9. Lecture 1: MATHEMATICAL MODELING OF CRYOCOOLERS, Lecture 2: PULSE-TUBE REFRIGERATORS: PRINCIPLES AND MODELING, at Solid State Physics Laboratory, New Delhi, Invited lectures on *Cryogenics,* in December 2002.
10. APPLICATION OF INVERSE TECHNIQUE IN ENGINEERING, presented at Mewbourne School of Petroleum and Geological Engineering, University of Oklahoma on 12th September 2003.
11. FLOW VISUALIZATION USING OPTICAL MEASUREMENT TECHNIQUES, presented at Department of Aerospace and Mechanical Engineering, University of Oklahoma, on 2nd October 2003.
12. LASER MEASUREMENT OF BUOYANCY-DRIVEN CONVECTION FIELDS, presented at Department of Mechanical Engineering, Louisiana State University, on 24th October 2003.
13. ROLE OF CONVECTION IN THE GROWTH OF OPTICAL CRYSTALS, presented at Department of Mechanical and Materials Engineering, Florida International University, on 10th November 2003.
14. LASER MEASUREMENT OF TEMPERATURE AND CONCENTRATION FIELDS IN BUOYANCY-DRIVEN CONVECTION, presented at Department of Mechanical Engineering, University of Minnesota, on 10th December 2003.
15. IMPORTANCE OF CONVECTION IN THE GROWTH OF OPTICAL CRYSTALS, presented at the symposium entitled *Topical meeting on Frontiers in Materials Science and Technology*, on 30th December 2004 at Center of Advanced Technology, Indore.
16. OPTICAL IMAGING AND CONTROL OF CONVECTION AROUND A CRYSTAL GROWING FROM ITS AQUEOUS SOLUTION, presented at the symposium entitled *Crystal Growth and Characterization* on 29th September 2005 at Loyola College, Chennai.
17. STRUCTURE OF LOW REYNOLDS NUMBER FLOW BEHIND A PRISM OF SQUARE CROSS-SECTION AT VARIOUS ORIENTATIONS, presented at the 50th (Golden Jubilee) ISTAM Congress at IIT Kharagpur, 14-17 December 2005.
18. Two lectures each on TRANSPORT PHENOMENA IN POROUS MEDIA and MEASUREMENTS IN TURBULENT FLOW, delivered at Department of Mechanical Engineering, Jadavpur University, Kolkata on 12th and 13th January 2007.
19. MODELING FLOW AND TRANSPORT IN A HIERARCHICAL POROUS MEDIUM, presented at the Indo-Australian Workshop on CFD APPROACH ON FLUID FLOW, HEAT AND MASS TRANSFER held at Department of Mathematics, IIT Roorkee during 12-14 April 2007.

20. GENERALIZED MODELING OF FLOW AND TRANSPORT IN POROUS MEDIA, presented at the Joint IIT Kanpur – NTU Singapore symposium on Mechanical, Aerospace, and Industrial Engineering held at NTU Singapore during 10-11 July 2007.
21. LASER MEASUREMENTS IN FLUID AND THERMAL SCIENCES, Keynote lecture delivered at the *International Conference on Recent Trends in Mechanical Engineering*, College of Engineering, Ujjain, KN 46-52, October 2007.
22. RECONSTRUCTION OF TIME-DEPENDENT CONCENTRATION GRADIENTS AROUND A KDP CRYSTAL GROWING FROM ITS AQUEOUS SOLUTION, **Subir Kar Memorial** Lecture delivered at the 37th Fluid Mechanics and Fluid Power Conference, BIT Mesra (Ranchi), during 10-12 December 2007; also see pp 195-208 in the conference proceedings.
23. GROWTH OF YAG CRYSTALS IN A CZOCHRALSKI PROCESS, presented at the INAE Annual Convention held during 7-8 December 2008 at RCI Hyderabad.
24. OPTICAL IMAGING OF CONVECTION DURING GROWTH OF KDP AND PROTEIN CRYSTALS, presented during the second joint symposium between NTU Singapore and IIT Kanpur during 5-6 April 2008.
25. REFRACTIVE INDEX METHODS FOR THE MEASUREMENT OF TEMPERATURE, SOLUTAL CONCENTRATION AND FLUID FLOW, presented at **AFFTS-2008** (National Conference on Advanced Fluid Flow and Thermal Sciences) held during 22-24 May 2008 (**Keynote**) at SVNIT Surat.
26. SIMULATION OF OSCILLATORY FLOW IN TUBULAR BIFURCATIONS ON UNSTRUCTURED GRIDS, presented at the International Workshop on New Horizons in Nuclear Reactor Thermal Hydraulics, held on 24th March 2009 at Bhabha Atomic Research Center, Mumbai (2009).
27. INTERFEROMETRY, SCHLIEREN, AND SHADOWGRAPH, presented at the International Symposium on Recent Trends in Flow Visualization, held at IIT Roorkee during 29-31 December 2009.
28. RECENT DEVELOPMENTS IN COMPUTATIONAL FLUID FLOW AND HEAT TRANSFER, presented at Vellore Institute of Technology, Vellore, 4th February 2011.
29. (i) OPTICAL MEASUREMENT USING REFRACTIVE INDEX AND SCATTERING TECHNIQUES and (ii) RECENT DEVELOPMENTS AND APPLICATIONS OF COMPUTATIONAL FLUID DYNAMICS, presented at National Institute of Technology Agartala, 8-9 March 2011.
30. OPTICAL MEASUREMENT TECHNIQUES IN FLUID AND THERMAL SCIENCES, presented at IIT Roorkee, 9th July 2011.
31. FREE AND FORCED JETS: EXPERIMENTS AND SIMULATION, presented at the theme meeting on FBR Core Design: Current Status and Future Directions, held on 19th September 2011 at IGCAR Kalpakkam.
32. OPTICAL MEASUREMENT TECHNIQUES IN TRANSPORT PHENOMENA, presented at the 2nd ICAMB conference held at VIT Vellore during 9-11 January 2012.

33. Lecture 1: INTRODUCTION TO INVERSE METHODS; Lecture 2: APPLICATIONS OF INVERSE TECHNIQUES, presented at the Department of Mechanical Engineering, IIT Roorkee, 2nd July 2012.
34. EXTRACTING DATA FROM IMAGE SEQUENCES USING INVERSE TECHNIQUES, Plenary Lecture at the National Workshop on Image Processing Applications in Industry, Medicine, and Aerospace, organized by DRDL Hyderabad held at the Research and Innovation Center, IITM research Park during 28-29 December 2012.
35. MODELING METHANE PRODUCTION FROM A HYDRATE RESERVOIR VIA SIMULTANEOUS DEPRESSURIZATION AND CO_2 SEQUESTRATION, Keynote Lecture at the Gas Hydrates Symposium held at National Institute of Oceanography, Goa on 18th January 2013.
36. IMAGING UNSTEADY THREE DIMENSIONAL FLUID FLOW AND TRANSPORT PHENOMENA, Plenary lecture at the National Laser Symposium-21 held at BARC Mumbai during 6-8 February 2013.
37. OPTICAL MEASUREMENT TECHNIQUES IN THERMAL SCIENCES, Invited Lecture delivered at BR Ambedkar NIT-Jalandhar, 22nd April 2013.
38. RESEARCH METHODOLOGY, Invited Lecture delivered at VIT Vellore, 25th May 2013.
39. FUNDAMENTALS AND MODELING OF DROPWISE CONDENSATION, three Invited Lectures delivered at IIT Roorkee, 24th June 2013.
40. HEAT CONDUCTION FUNDAMENTALS, ten invited lectures delivered at SVNIT Surat, 1-2 July 2013.
41. (A) CASE STUDIES IN EXPERIMENTAL FLUID MECHANICS AND HEAT TRANSFER; (B) LITERATURE SURVEY AND PROBLEM DEFINITION IN RESEARCH, Lectures delivered at the NSFMFP workshop on Research Methodology, NMMIT Allahabad, 27-28 September 2013.
42. FLOW AND TRANSPORT IN POROUS MEDIA WITH APPLICATIONS, presented at the TEQIP workshop (*Pravartana*) held at IIT Kanpur during 5-7 October 2013.
43. PROBLEM DEFINITION AND VALIDATION, Inaugural lecture at the course entitled *Research methodology*, Bengal Engineering and Science University, Kolkata, 29th January 2014.
44. CASE STUDIES IN EXPERIMENTAL FLUID MECHANICS, lectures delivered a at the NSFMFP-sponsored workshop on Research Methodology, NIT Surathkal during 10-12 July 2014.
45. DROPWISE CONDENSATION OVER TEXTURED SURFACES: INFLUENCE OF DROP SHAPE AND COALESCENCE, **Keynote** Lecture**,** International Heat Transfer Conference – 15, held at Kyoto Japan (August 2014) (only speaker selected from India).
46. FLOW AND TRANSPORT IN POROUS MEDIA WITH APPLICATIONS, **Invited Distinguished** lecture, presented on 19th March 2015 at The Institute of Fluid Science, Tohoku University, Japan.

47. SHAPE AND MOTION OF A LIQUID DROP PLACED OVER A TEXTURED SURFACE, **Keynote** lecture, 17th ISME Conference, 3-4 October 2015, held at IIT Delhi.
48. FLOW AND HEAT TRANSFER DURING DROP SPREADING OVER A HORIZONTAL SURFACE, **Keynote** lecture, ASCHT2015, Busan, S. Korea (November 2015).
49. TECHNOLOGY DEVELOPMENT FOR EXTRACTION OF METHANE FROM UNCONVENTIONAL HYDROCARBON RESOURCES, **Keynote** lecture delivered during the KDMIPE Day celebrations of ONGC Dehradun, 19th December 2015.
50. CONTACT LINE MODELING OF DROP SPREADING ON TEXTURED SURFACES, Institute Lecture delivered at the Novosibirsk State University, Russia in June 2019.
51. DROPWISE CONDENSATION ON TEXTURED SURFACES: MODELING AND EXPERIMENTS, **Plenary** lecture delivered at IIT Mandi during the International Conference on Computational Mechanics and Simulation, December 2019.
52. M.V. Krishnamurthy endowed **Plenary lecture** entitled SPREADING AND COALESCENCE CHARACTERISTICS OF LIQUID DROPS ON TEXTURED SURFACES, during the IHMTC-ASTFE conference at IIT Roorkee, December 2019.
53. MATRIX METHODS IN NUMERICAL SIMULATION, invited lecture delivered in a faculty development program at NIT Jalandhar (2021).
54. MEASUREMENT OF FLUID VELOCITY, invited lecture delivered in a faculty development program at NIT Manipur (2021).
55. OPTICAL MEASUREMENT OF TEMPERATURE, SPECIES CONCENTRATION, AND VELOCITY IN FLUID MEDIA, invited lecture delivered in a faculty development program at SRM University, Chennai (2021).
56. EXPERIMENTAL VALIDATION OF NUMERICAL SIMULATIONS IN CFD, invited lecture delivered at the National Program in research Methodology at IIT Roorkee (2022).
57. BLOOD FLOW IN ARTERIAL GEOMETRIES AND AN EXAMPLE OF A BIOMEDICAL DEVICE, **Plenary** lecture at the International Biomedical Engineering Conference, RCOEM, Nagpur (2022).
58. CONTINUUM MODELING OF BLOOD VISCOSITY FOR CFD APPLICATIONS, **Plenary** lecture at the International Heat Transfer and Fluid Mechanics Conference held at Aligarh Muslim University, Aligarh (2022).
59. DIFFUSIVE FLUX MODELING OF BLOOD VISCOSITY, Keynote lecture at the International Fluid Mechanics and Fluid Power Conference held at IIT Roorkee (2022).
60. CONTACT LINE MODELING OF LIQUID DROPS SPREADING OVER TEXTURED SURFACES, **Plenary** lecture at the 1st Indian conference on Micro Nano Fluidics (ICOM 2023) at IIT Madras (2023).
61. AN ENVIABLE JOURNEY IN EXPERIMENTS, **Keynote** lecture during the PMRF symposium held at IIT Indore (2024).

62. DIFFUSIVE FLUX MODELING OF RBC TRANSPORT DURING BLOOD FLOW IN MICROCHANNELS, **Keynote** lecture at the ICHMT International Symposium on Advances in Computational Heat Transfer (9^{th} CHT-24) 2024, Istanbul, Turkiye.
63. CHALLENGES IN DEVELOPING A BLOOD PUMP AS AN ASSIST DEVICE FOR THE HUMAN HEART, **Plenary** lecture delivered at the International Conference on Experimental Mechanics, IIT Madras (2024).
64. DIFFUSIVE FLUX MODELING OF HEMATOCRIT TRANSPORT IN A MICROFLUIDIC DEVICE, **Plenary** lecture delivered at the International Conference on Micro Nano Fluidics (ICOM 2025), IIT Guwahati.
65. Time-resolved Modeling of Dropwise Condensation Over a Nanopillared Substrate, **Plenary** lecture delivered at the International Conference on Computational Mechanics and Simulation (ICCMS 2025) at IIT Bhubaneswar.

OTHER ACTIVITIES

1. President, National Society of Fluid Mechanics and Fluid Power, January 2012 – December 2014.
2. Founder member, Indian Biomedical Engineering Society, since July 2025.
3. Author of popular scientific articles written: (a) CHAOS IN PHYSICAL SYSTEMS, The Hindu, 7 December 1988. (b) DISPOSAL OF NUCLEAR WASTE, Science Reporter, October, 1990. (c) MODELING REGENERATORS IN STIRLING CRYOCOOLERS, in **Directions** – a research publication of IIT Kanpur, 1999. (d) FORWARD AND INVERSE MEASUREMENTS, in **Directions,** Vol. 8(2), 2007. (e) EXPLOITATION OF GAS HYDRATES in **Directions**, Vol. 9(1), 2008. (f) SIMULATION OF OSCILLATORY FLOW IN AORTIC BIFURCATIONS, in **Directions**, Vol. 10(1), 2009. (g) CREATING A RESEARCH VISION FOR IIT KANPUR, in **Directions**, Vol. 12(1) (2012). (h) IMAGING TRANSPORT PHENOMENA AND SURFACE MORPHOLOGY IN CRYSTAL GROWTH, in **Directions**, Vol. 13(1) (2013); (i) LIFE WITH EXPERIMENTS, in **INAE** Newsletter, August 2014.
4. High-level Summer Consultancy: Spent two months at ANURAG, (Advanced Numerical Research and Analysis Group), Ministry of Defence, Hyderabad from 15 May to 20 June 1993. Spent one week at C-DAC, Pune, for parallelizing an enhanced oil recovery code on PARAM architecture (June 1994). These efforts led to the introduction of a parallel computing environment at IIT Kanpur.
5. Member, Research Advisory Committee for *Gas Hydrates Program* of Department of Ocean Development, New Delhi (2008-onwards).
6. Member, Board of Courses and Studies, Department of Mechanical Engineering, Indian School of Mines, Dhanbad (2006-2008).

7. Member, Academic Monitoring Committee of the Department of Mechanical Engineering, Indian Institute of Technology Kharagpur (2010 onwards).
8. Member, International Advisory Committee, The Asian Symposium on Computational Heat Transfer and Fluid Flow (ASCHT'11) held at Kyoto University during 22-26 September 2011 and ASCHT'13 to be held at Hong Kong University of Science and Technology during 3-6 June 2013.
9. Member, Academic Council, Homi Bhabha National Institute, DAE, Mumbai (2011-2015).
10. IIT Kanpur representative in the Asia-Africa Development University Network (AADUN), University of Malaya, Kaula Lampur, Malaysia (2009-2012).
11. IIT Kanpur representative in CREST - Collaboration for Research in Engineering, Science and Technology, an international initiative of the Government of Malaysia with leading Universities in US, Singapore, and Taiwan.
12. Member, Expert Advisory Group on the *Good Governance project* of World Bank for the TEQIP phase II initiative. I was responsible for developing course material in the context of training facilitators who will address the members of Board of Governors of various educational institutes.
13. Member, Board of Studies, Department of Mechanical Engineering, Harcourt Butler Technological Institute, Kanpur (2012 onwards).
14. **Major collaborators** (within India): Bhabha Atomic Research Center, RRCAT Indore, IGCAR Kalpakkam, DRDL Hyderabad, SSPL New Delhi, NIOT Chennai, National Gas Hydrates Program, (Ministry of Petroleum).
15. **Major collaborators** (international): Kyoto University, Japan; Lawrence Berkeley Laboratory, USA; ETH Zurich, Switzerland; IT'IS Zurich, University of Minnesota, USA.

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3 December 2025