

Supreet Singh Bahga

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EDUCATION

- 03/09-04/13 **Stanford University**, California, USA
Doctor of Philosophy; *Mechanical Engineering*, GPA: 4.12/4 (MS+PhD)
- 09/07-03/09 **Stanford University**, California, USA
Master of Science, *Mechanical Engineering*
- 07/03-06/07 **Indian Institute of Technology Bombay**, Mumbai, India
Bachelor of Technology, *Mechanical Engineering*, GPA: 9.73/10
Ranked 1 in Department of Mechanical Engineering

AWARDS & HONORS

- Early Career Award (Mrs. Veena Arora Faculty Research Award), IIT Delhi, 2024
- Teaching Excellence Award, IIT Delhi, 2017-18.
- Kusuma Young Faculty Fellowship, IIT Delhi, 07/13-06/18
- Kodak Fellowship, Stanford University 09/10-04/13
- Institute Silver Medal, IIT Bombay, 2007
- Stanford Graduate Fellowship, Stanford University 06/09-06/11
- School of Engineering Fellowship, Stanford University, 09/07-03/09
- Second Prize, Michigan NNIN/C Simulation & Modeling Contest, 2011
- Institute Academic Awards, IIT Bombay 2004-2007

WORK EXPERIENCE

- 09/20-present **Associate Professor of Mechanical Engineering**
Indian Institute of Technology Delhi, New Delhi.
- 07/13-09/20 **Assistant Professor of Mechanical Engineering**
Indian Institute of Technology Delhi, New Delhi.
 - Research: experimental and computational micro/nano-fluidics, electrokinetics and electrohydrodynamics, paper-microfluidics, lab-on-a-chip devices.
 - Teaching: microfluidics, thermodynamics, experimental methods, gas dynamics.
- 03/09-04/13 **PhD Thesis: High sensitivity electrokinetic assays based on propagation and interaction of ion concentration shock waves**
Prof. Juan G. Santiago, Stanford Microfluidics Laboratory, Stanford, CA.
 - Developed and experimentally validated numerical schemes for simulating ion-concentration shock waves in non-linear electrokinetics.
 - Invented three microfluidic techniques leveraging electrokinetic shock wave interaction to: (i) couple isotachopheresis (ITP) with capillary electrophoresis (CE), (ii) increase sensitivity of ITP based chemical detection, and (iii) sequence-specific detection of DNA fragments.
 - Applied on-chip ITP/CE for detection of nucleic acids, environmental pollutants, and toxins.
- 09/08-01/09 **Research Assistant: Electro-osmotic Flow Over Superhydrophobic Surfaces**
Prof. Martin Z. Bazant, Stanford, CA.
 - Theoretically analyzed electro-osmotic flow (EOF) over patterned surfaces of non-uniform charge and local hydrophobicity.
 - Developed guidelines for design of superhydrophobic surfaces for enhancing EOF in microdevices.
- 09/07-09/08 **Research Assistant: Chemical Mechanisms for Engine Surrogate Fuels**
Prof. Heinz Pitsch, Stanford, CA.
 - Developed and validated detailed chemical mechanism to predict high temperature combustion characteristics of components of engine surrogate fuel, including substituted aromatic species.
- 01/06-05/07 **B.Tech. Thesis: Instability Analysis of Advanced Heavy Water Reactor**
Prof. Jagdeep B. Doshi, IIT Bombay, Mumbai.
 - Developed and validated thermal hydraulics code to analyze thermally induced instabilities in boiling water nuclear reactors.

TECHNICAL SKILLS

Programming:: C/C++, Fortran, Matlab, MPI, CUDA, Python, LabView.
Software:: Matlab, Maple, AutoCAD, Visualization Toolkit, COMSOL, L^AT_EX.
Experimental: Microfluidic device fabrication, Epifluorescence Microscopy, Particle Image Velocimetry, Microchip electrokinetics and electrophoresis, Electrospray, Electrohydrodynamic Jet Printing

1. Prateek Gupta and Supreet Singh Bahga. Mechanism of sinuous and varicose modes in electrokinetic instability. *Physical Review E*, 110(3):035106, 2024
2. Anupam Choubey and Supreet Singh Bahga. Electrohydrodynamic jet printed templates for hot embossing of microfluidic devices. *Journal of Micromechanics and Microengineering*, 34(10):105004, 2024
3. Sourabh Das, Ishaan Gupta, and Supreet Singh Bahga. Universal correlation for the critical diameter of deterministic lateral displacement devices with polygonal posts. *Biomicrofluidics*, 18(4), 2024
4. Amit Jangra, Shaurya Shriyam, Juan G Santiago, and Supreet Singh Bahga. A neural network model for rapid prediction of analyte focusing in isotachopheresis. *Electrophoresis*, 45(7-8):599–608, 2024
5. Himadri Sekhar Basu, Sasidhar Kondaraju, and Supreet Singh Bahga. Lattice boltzmann finite-difference-based model for fully nonlinear electrohydrodynamic deformation of a liquid droplet. *Physical Review E*, 107(6):065305, 2023
6. Raghvendra Gupta, Supreet Singh Bahga, and Amit Gupta. Effect of ambient temperature and discharge current on thermo-electrochemical behaviour of lithium-ion cells using surrogate modelling and analysis. *Journal of The Electrochemical Society*, 2023
7. Abhishek K Singh, Anupam Choubey, Rajiv K Srivastava, and Supreet Singh Bahga. Physics of moderately stretched electrified jets in electrohydrodynamic jet printing. *Physical Review E*, 107(4):045103, 2023
8. Praveen Sharma, Supreet Singh Bahga, and Amit Gupta. Modeling of dispersion of aerosolized airborne pathogens exhaled in indoor spaces. *Physics of Fluids*, 35(4), 2023
9. Anupam Choubey, Kaushlendra Dubey, and Supreet Singh Bahga. Rapid prototyping of polydimethylsiloxane (pdms) microchips using electrohydrodynamic jet printing: Application to electrokinetic assays. *Electrophoresis*, 44(7-8):725–732, 2023
10. Santosh Kumar Jena, Tushar Srivastava, Supreet Singh Bahga, and Sasidhar Kondaraju. Effect of channel width on droplet generation inside t-junction microchannel. *Physics of Fluids*, 35(2), 2023
11. Vinit Kumar Yadav, Yogesh M Patel, Supreet Singh Bahga, Samaresh Das, and Dhiman Mallick. Compact, high-performance positive magnetophoresis chip with integrated patterned magnet for efficient particle trapping. *Journal of Microelectromechanical Systems*, 32(2):184–194, 2023
12. Yogesh M Patel, Ritika Malik, Kedar Khare, and Supreet Singh Bahga. Accurate holographic cytometry using three-dimensional hydrodynamic focusing. *Journal of Micromechanics and Microengineering*, 33(2):024003, 2023
13. Sufia Khatoon, Jyoti Phirani, and Supreet Singh Bahga. Fast bayesian inference for inverse heat conduction problem using polynomial chaos and karhunen–loeve expansions. *Applied Thermal Engineering*, page 119616, 2022
14. Abhishek K Singh, Rajiv K Srivastava, and Supreet Singh Bahga. Regimes of steady jetting in electrohydrodynamic jet printing. *Physical Review Fluids*, 7(6):063701, 2022
15. Anirudh Nath, Rohit Mehta, Raghvendra Gupta, Supreet Singh Bahga, Amit Gupta, and Shubhendu Bhasin. Control-oriented physics-based modeling and observer design for state-of-charge estimation of lithium-ion cells for high current applications. *IEEE Transactions on Control Systems Technology*, 30(6):2466–2479, 2022
16. Supreet Singh Bahga and Prateek Gupta. Electrophoresis simulations using chebyshev pseudo-spectral method on a moving mesh. *Electrophoresis*, 43(5-6):688–695, 2022
17. Wasim Akram, Amit Gupta, and Supreet Singh Bahga. A simplified model of oscillating electrolytes. *Electrophoresis*, 43(5-6):708–716, 2022
18. Alexandre S Avaro, Yixiao Sun, Kaiying Jiang, Supreet S Bahga, and Juan G Santiago. Web-based open-source tool for isotachopheresis. *Analytical Chemistry*, 93:15768–15774, 2021

19. Kaushlendra Dubey, Sanjeev Sanghi, Amit Gupta, and Supreet Singh Bahga. Electrokinetic instability due to streamwise conductivity gradients in microchip electrophoresis. *Journal of Fluid Mechanics*, 925:A14, 2021
20. Sufia Khatoon, Jyoti Phirani, and Supreet Singh Bahga. Accelerated bayesian inference-based history matching of petroleum reservoirs using polynomial chaos expansions. *Inverse Problems in Science and Engineering*, 29:3086–3116, 2021
21. P Sridhar, Supreet S Bahga, and Jitendra P Khatait. Design of precision hot embossing machine for micropatterning on pmma. *Journal of Micro-and Nano-Manufacturing*, 9(3):030906, 2021
22. Nilesh D Pawar, Supreet Singh Bahga, Sunil R Kale, and Sasidhar Kondaraju. Numerical investigation of multiple droplet growth dynamics on a solid surface using three-dimensional lattice boltzmann simulations. *AIP Advances*, 11(4):045116, 2021
23. Prateek Gupta and Supreet Singh Bahga. High-resolution numerical simulations of electrophoresis using the fourier pseudo-spectral method. *Electrophoresis*, 42(7-8):890–898, 2021
24. Santosh Kumar Jena, Supreet Singh Bahga, and Sasidhar Kondaraju. Prediction of droplet sizes in a t-junction microchannel: Effect of dispersed phase inertial forces. *Physics of Fluids*, 33(3):032120, 2021
25. R Singh, SS Bahga, and A Gupta. Electrohydrodynamic droplet formation in a t-junction microfluidic device. *Journal of Fluid Mechanics*, 905:A29, 2020
26. Yogesh M Patel, Sanidhya Jain, Abhishek Kumar Singh, Kedar Khare, Sarita Ahlawat, and Supreet Singh Bahga. An inexpensive microfluidic device for three-dimensional hydrodynamic focusing in imaging flow cytometry. *Biomicrofluidics*, 14(6):064110, 2020
27. Anirudh Nath, Raghvendra Gupta, Rohit Mehta, Supreet Singh Bahga, Amit Gupta, and Shubhendu Bhasin. Attractive ellipsoid sliding mode observer design for state of charge estimation of lithium-ion cells. *IEEE Transactions on Vehicular Technology*, 69(12):14701–14712, 2020
28. Himadri Sekhar Basu, Supreet Singh Bahga, and Sasidhar Kondaraju. A fully coupled hybrid lattice boltzmann and finite difference method-based study of transient electrokinetic flows. *Proceedings of the Royal Society A*, 476(2242):20200423, 2020
29. Venu Gopal Agarwal, Rattandeep Singh, Supreet Singh Bahga, and Amit Gupta. Dynamics of droplet formation and flow regime transition in a t-shaped microfluidic device with a shear-thinning continuous phase. *Physical Review Fluids*, 5(4):044203, 2020
30. Sufia Khatoon, Jyoti Phirani, and Supreet Singh Bahga. An analytical solution of the inverse problem of capillary imbibition. *Physics of Fluids*, 32(4):041704, 2020
31. Mohammad Babar, Kaushlendra Dubey, and Supreet Singh Bahga. Effect of surface conduction-induced electromigration on current monitoring method for electroosmotic flow measurement. *Electrophoresis*, 41(7-8):570–577, 2020
32. Rattandeep Singh, Supreet Singh Bahga, and Amit Gupta. Electric field induced droplet deformation and breakup in confined shear flows. *Physical Review Fluids*, 4(3):033701, 2019
33. Nilesh D Pawar, Supreet Singh Bahga, Sunil R Kale, and Sasidhar Kondaraju. Symmetric and asymmetric coalescence of droplets on a solid surface in the inertia-dominated regime. *Physics of Fluids*, 31(9):092106, 2019
34. Manjinder Singh, Nilesh D Pawar, Sasidhar Kondaraju, and Supreet Singh Bahga. Modeling and simulation of dropwise condensation: A review. *Journal of the Indian Institute of Science*, 99(1):157–171, 2019
35. Rattandeep Singh, Supreet Singh Bahga, and Amit Gupta. Electrohydrodynamics in leaky dielectric fluids using lattice boltzmann method. *European Journal of Mechanics-B/Fluids*, 74:167–179, 2019
36. Nilesh D Pawar, Sunil R Kale, Supreet Singh Bahga, Hassan Farhat, and Sasidhar Kondaraju. Study of microdroplet growth on homogeneous and patterned surfaces using lattice boltzmann modeling. *Journal of Heat Transfer*, 141(6):062406, 2019

37. Kaushlendra Dubey, Amit Gupta, and Supreet Singh Bahga. Scaling behavior in on-chip field-amplified sample stacking. *Electrophoresis*, 40(5):730–739, 2019
38. Manjinder Singh, Naresh Varma Datla, Sasidhar Kondaraju, and Supreet Singh Bahga. Enhanced thermal performance of micro heat pipes through optimization of wettability gradient. *Applied Thermal Engineering*, 143:350–357, 2018
39. Manjinder Singh, Sasidhar Kondaraju, and Supreet Singh Bahga. Mathematical model for dropwise condensation on a surface with wettability gradient. *Journal of Heat Transfer*, 140(7):071502, 2018
40. Kaushlendra Dubey, Amit Gupta, and Supreet Singh Bahga. Coherent structures in electrokinetic instability with orthogonal conductivity gradient and electric field. *Physics of Fluids*, 29(9):092007, 2017
41. Rahul Gaur and Supreet Singh Bahga. Electrohydrodynamic instability of ion-concentration shock wave in electrophoresis. *Physical Review E*, 95(6):063109, 2017
42. Roshan Patra, Shivam Agarwal, Sasidhar Kondaraju, and Supreet Singh Bahga. Membraneless variable focus liquid lens with manual actuation. *Optics Communications*, 389:74–78, 2017
43. S Ashraf, G Visavale, SS Bahga, and J Phirani. Spontaneous imbibition in parallel layers of packed beads. *The European Physical Journal E*, 40(4):39, 2017
44. Surabhi Sharan, Prateek Gupta, and Supreet Singh Bahga. Mechanism of electrohydrodynamic instability with collinear conductivity gradient and electric field. *Physical Review E*, 95(2):023103, 2017
45. Manjinder Singh, Sasidhar Kondaraju, and Supreet Singh Bahga. Enhancement of thermal performance of micro heat pipes using wettability gradients. *International Journal of Heat and Mass Transfer*, 104:400–408, 2017
46. Aditya Budaraju, Jyoti Phirani, Sasidhar Kondaraju, and Supreet Singh Bahga. Capillary displacement of viscous liquids in geometries with axial variations. *Langmuir*, 32(41):10513–10521, 2016
47. Esha Sharma, Archana Samanta, Jit Pal, Supreet S Bahga, Bhanu Nandan, and Rajiv K Srivastava. High internal phase emulsion ring-opening polymerization of pentadecanolide: Strategy to obtain porous scaffolds in a single step. *Macromolecular Chemistry and Physics*, 217(15):1752–1758, 2016
48. Supreet Singh Bahga, Romir Moza, and Mayank Khichar. Theory of multi-species electrophoresis in the presence of surface conduction. *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 472(2186):20150661, 2016
49. Aman Kumar Jha and Supreet Singh Bahga. Uncertainty quantification in modeling of microfluidic t-sensor based diffusion immunoassay. *Biomicrofluidics*, 10(1):014105, 2016
50. Prateek Gupta and Supreet Singh Bahga. Stability of electrophoretic transport of ions. *Physical Review E*, 92(2):022301, 2015
51. Supreet S Bahga and Juan G Santiago. Coupling isotachopheresis and capillary electrophoresis: a review and comparison of methods. *Analyst*, 138(3):735–754, 2013
52. Supreet S Bahga, Crystal M Han, and Juan G Santiago. Integration of rapid dna hybridization and capillary zone electrophoresis using bidirectional isotachopheresis. *Analyst*, 138(1):87–90, 2013
53. Denitsa Milanova, Robert D Chambers, Supreet S Bahga, and Juan G Santiago. Effect of pvp on the electroosmotic mobility of wet-etched glass microchannels. *Electrophoresis*, 33(21):3259–3262, 2012
54. Supreet S Bahga, Moran Bercovici, and Juan G Santiago. Robust and high-resolution simulations of nonlinear electrokinetic processes in variable cross-section channels. *Electrophoresis*, 33(19-20):3036–3051, 2012

55. Giancarlo Garcia-Schwarz, Anita Rogacs, Supreet S Bahga, and Juan G Santiago. On-chip isotachophoresis for separation of ions and purification of nucleic acids. *JoVE (Journal of Visualized Experiments)*, (61):e3890, 2012
56. Supreet S Bahga and Juan G Santiago. Concentration cascade of leading electrolyte using bidirectional isotachophoresis. *Electrophoresis*, 33(6):1048–1059, 2012
57. Viktor Shkolnikov, Supreet S Bahga, and Juan G Santiago. Desalination and hydrogen, chlorine, and sodium hydroxide production via electrophoretic ion exchange and precipitation. *Physical Chemistry Chemical Physics*, 14(32):11534–11545, 2012
58. Denitsa Milanova, Robert D Chambers, Supreet S Bahga, and Juan G Santiago. Electrophoretic mobility measurements of fluorescent dyes using on-chip capillary electrophoresis. *Electrophoresis*, 32(22):3286–3294, 2011
59. Supreet S Bahga, Robert D Chambers, and Juan G Santiago. Coupled isotachophoretic pre-concentration and electrophoretic separation using bidirectional isotachophoresis. *Analytical chemistry*, 83(16):6154–6162, 2011
60. Supreet S Bahga, Govind V Kaigala, Moran Bercovici, and Juan G Santiago. High-sensitivity detection using isotachophoresis with variable cross-section geometry. *Electrophoresis*, 32(5):563–572, 2011
61. Supreet S Bahga, Moran Bercovici, and Juan G Santiago. Ionic strength effects on electrophoretic focusing and separations. *Electrophoresis*, 31(5):910–919, 2010
62. Supreet S Bahga, Olga I Vinogradova, and Martin Z Bazant. Anisotropic electro-osmotic flow over super-hydrophobic surfaces. *Journal of Fluid Mechanics*, 644:245–255, 2010

BOOK

1. Supreet Singh Bahga, *Experimental Uncertainty Analysis: A Textbook for Science and Engineering Students*, White Falcon Publishing, 2021, ISBN 978-1636402321.

1. Anirudh Nath, Rohit Mehta, Raghvendra Gupta, Supreet Singh Bahga, Amit Gupta, and Shubhendu Bhasin. A comparative study of observer-based state-of-charge estimation using single-particle model with electrolyte dynamics and equivalent circuit model of lithium-ion cells. *IFAC-PapersOnLine*, 55(1):541–546, 2022
2. Sufia Khatoon, Jyoti Phirani, and Supreet Singh Bahga. Estimation of flux in a disc brake system using accelerated bayesian inference. In *Proceedings of the 26th National and 4th International ISHMT-ASTFE Heat and Mass Transfer Conference December 17-20, 2021, IIT Madras, Chennai-600036, Tamil Nadu, India*. Begel House Inc., 2021
3. Abhishek K Singh, Kaushlendra Dubey, Rajiv K Srivastava, and Supreet Singh Bahga. Scaling behavior in electrohydrodynamic jetting of polymeric solutions. In *ASME International Mechanical Engineering Congress and Exposition*, volume 59476, page V010T12A018. American Society of Mechanical Engineers, 2019
4. Sufia Khatoon, Jyoti Phirani, and Supreet Singh Bahga. Polynomial chaos based solution to inverse problems in petroleum reservoir engineering. In *Fluids Engineering Division Summer Meeting*, volume 59087, page V005T05A076. American Society of Mechanical Engineers, 2019
5. Nilesh D. Pawar, Sunil R. Kale, Supreet Singh Bahga, Sasidhar Kondaraju, “Study of inertial coalescence of droplets on a solid substrate using lattice boltzmann modelling ”, CSME-CFDSC Congress 2019, June 2–5, 2019, Western University, London, Ontario, Canada.
6. Kaushlendra Dubey, Amit Gupta, and Supreet Singh Bahga. Electrokinetic dispersion in field amplified sample stacking. In *ASME 2018 16th International Conference on Nanochannels, Microchannels, and Minichannels*, pages V001T08A001–V001T08A001. American Society of Mechanical Engineers, 2018
7. Rattandeep Singh, Supreet Singh Bahga, and Amit Gupta. Droplet deformation and breakup due to shear flow and electric field in a confined geometry. In *ASME 2018 16th International Conference on Nanochannels, Microchannels, and Minichannels*, pages V001T02A003–V001T02A003. American Society of Mechanical Engineers, 2018
8. Manjinder Singh, Naresh Varma Datla, Supreet Singh Bahga, and Sasidhar Kondaraju. Optimization of wettability gradient for enhancement of thermal performance of micro heat pipes. In *ASME 2018 16th International Conference on Nanochannels, Microchannels, and Minichannels*, pages V001T02A007–V001T02A007. American Society of Mechanical Engineers, 2018
9. Kaushlendra Dubey, Vidushi, Amit Gupta, and Supreet Singh Bahga. Dynamic mode decomposition of unstable micro-flows. In *Proceedings of the 24th National and 2nd International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTTC-2017), December 27-30, 2017, BITS-Pilani, Hyderabad, India*.
10. Mayank Khichar, Romir Moza, and Supreet Singh Bahga. Effect of surface conduction on propagation of ion-concentration shock waves in isotachopheresis. In *ASME 2015 13th International Conference on Nanochannels, Microchannels, and Minichannels*, pages V001T04A011–V001T04A011. American Society of Mechanical Engineers, 2015
11. Prateek Gupta and Supreet Singh Bahga. Stability analysis of oscillating electrolytes. In *ASME 2015 13th International Conference on Nanochannels, Microchannels, and Minichannels*, pages V001T04A010–V001T04A010. American Society of Mechanical Engineers, 2015
12. Zeeshan Ahmad, Rattandeep Singh, Supreet Singh Bahga, and Amit Gupta. Droplet formation in a t-junction microfluidic device in the presence of an electric field. In *ASME 2015 13th International Conference on Nanochannels, Microchannels, and Minichannels*, pages V001T04A005–V001T04A005. American Society of Mechanical Engineers, 2015
13. Nilesh D. Pawar, Sunil R. Kale, Supreet Singh Bahga, Sasidhar Kondaraju, A three-dimensional lattice Boltzmann modeling for single and multiple droplet growth dynamics during condensation, *10th International Conference on Boiling and Condensation Heat Transfer* March 12–15, 2018, Nagasaki, Japan
14. S. S. Bahga, C. M. Han, J. G. Santiago, “Rapid Southern Blot-Type Assay Using Bidirectional Isotachopheresis”, *MicroTAS*, Oct 28–Nov 1, 2012, Okinawa, Japan.

15. S. S. Bahga, G. V. Kaigala, M. Bercovici, J. G. Santiago, "Strongly Convergent Channels for High Sensitivity Label-Free Chemical Detection Using Isotachopheresis", *MicroTAS*, Oct 3–7, 2010, Groningen, The Netherlands.
16. K. Narayanaswamy, S. S. Bahga, G. Blanquart, H. Pitsch, "A Consistent Chemical Mechanism for Oxidation of Substituted Aromatic Species", *6th US National Combustion Meeting*, May 17–20, 2009, Ann Arbor, Michigan.
17. SS Bahga and JB Doshi. Non-linear analysis of out-of-phase instabilities in advanced heavy water reactor. In *ASME 2007 International Mechanical Engineering Congress and Exposition*, pages 1745–1754. American Society of Mechanical Engineers, 2007
18. SS Bahga, A Bhattacharya, and Roop L Mahajan. Numerical modeling of buoyancy induced convection in finned heat sinks in presence of unheated and heated shrouds. In *ASME 2005 International Mechanical Engineering Congress and Exposition*, pages 725–731. American Society of Mechanical Engineers, 2005

PUBLISHED ABSTRACTS, NON-REFEREED PROCEEDINGS, POSTERS, AND PRESENTATIONS

1. Gupta, R., Bahga, S.S., Gupta, A., "An experimental exploration of long term effect of immersion cooling on the discharge capacity of commercial lithium-ion cells", 14th ABAA conference, Ho chi minh, Vietnam (2023).
2. Patel, Y.M., Joshi, R., Kulshreshtha, R., Khare, K., Bahga, S.S., "Label-free Classification of Breast Cancer Cells using Microfluidic Holographic Flow Cytometry", *AJKFluids 2023* (ASME - JSME - KSME Fluids Engineering Division), July 9–13, 2023, Osaka, Japan
3. Choubey, A., Bahga, S.S., "Electrohydrodynamic jet assisted rapid prototyping of non-sacrificial microfluidic templates: application to soft lithography and hot embossing", Poster Presentation, *MicroTAS 2023* (27th International Conference on Miniaturized Systems for Chemistry and Life Sciences), 15–19 October, 2023, Katowice, Poland.
4. Khatoon, S., Phirani J., Bahga, S. S., "Inverse problems in thermos-fluid systems using polynomial chaos expansions and Bayesian inference", Poster Presentation (Received Best Poster Award), *SIAM Conference on Mathematics of Data Science (MDS22) 2022*, San Diego, California, United States.
5. Gupta, R., Mehta, R., Bahga, S. S., Gupta, A. "Thermal Behaviour Prediction of Commercial Lithium-Ion Cells Under Different C-Rate and Ambient Conditions Using Surrogate Modelling". *ECS Meeting*, July 2022 (Digital Presentation).
6. Khatoon, S., Jain, A., Bahga, S. S., Phirani J., "Bayesian inference approach for solving inverse fluid flow problems in petroleum engineering", *INCAM 2019*, July 3-5, 2019, IISc Bangalore, India,.
7. Rattandeeep Singh, Venu Agarwal, Supreet Singh Bahga, Amit Gupta, "Electric control of droplet generation in a T-shaped microfluidic device", *Physics and Chemistry of Microfluidics* (Gordon Research Conference), June 16-21, 2019, Hong Kong, CN.
8. Abhishek Kumar Singh, Ajmera Sanketh Kumar, Rajiv Kumar Srivastava, and Supreet Singh Bahga, "Customised electrohydrodynamic jet printing with polymeric inks" (2nd Prize), *Young researchers symposium on emerging trends in textile, fiber and polymer research*, May 15-17, 2019, IIT Delhi, New Delhi, India.
9. Abhishek Kumar Singh, Ajmera Sanketh Kumar and Supreet Singh Bahga, "Study of transient electrokinetic flows" (Oral Presentation), *12th International Conference on Complex Fluids and Soft Matter*, December 6 – 9, 2018. IIT Roorkee, Roorkee, India.
10. Abhishek Kumar Singh, Ajmera Sanketh Kumar, Rajiv Kumar Srivastava and Supreet Singh Bahga, "Customised electrohydrodynamic jet printing with polymeric inks" (Best Poster Award), *12th International Conference on Complex Fluids and Soft Matter*, December 6 – 9, 2018. IIT Roorkee, Roorkee, India.
11. Ajmera Sanketh Kumar, Archit Agarwal, Rattandeeep Singh and Supreet Singh Bahga, "A novel co-flow microfluidic device to generate polyHIPEs" (Oral Presentation), *12th International Conference on Complex Fluids and Soft Matter*, December 6 – 9, 2018. IIT Roorkee, Roorkee, India.

12. Ajmera Sanketh Kumar, Rajiv Kumar Srivastava, and Supreet Singh Bahga, "Creating Poly-HIPEs through HIPE generation in a novel Co-flow device." (Poster), *Advances in Polymer Science & Technology (APA-2018)* November 1-3, 2018, Kathmandu, Nepal.
13. Khatoon, S., Jain, A., Bahga, S. S., Phirani J., "Uncertainty quantification in petroleum reservoir simulations", Workshop by ONGC & Pan-IIT Consortium on Energy Resources: *Advances in Technology and Future Outlook*, IIT Kharagpur, India, November 23 – 24, 2018.
14. Khatoon, S., Bahga, S. S., Phirani J., "Stochastic simulation in petroleum reservoirs", *InterPore Symposium: Flow and Transport in Porous Media*, IIT Delhi, India, December 14, 2017.
15. Singh, R., Bahga, S.S. and Gupta, A., "A lattice Boltzmann model for electrohydrodynamics in leaky dielectric fluids", *InterPore Symposium: Flow and Transport in Porous Media*, IIT Delhi, India, December 14, 2017.
16. Supreet Singh Bahga, Kaushalendra Dubey, "Chaotic Micro-Mixing in Microchannels using Electrokinetic Instability" (Invited Talk), *Microfluidics, Liquid Handling and Lab on a Chip Conference*, Jan 18-19 2017, Mumbai.
17. Modelling of non-linear electrophoresis in micro- and nano-fluidic devices, *EMN Meeting on Microfluidics and Nanofluidics*, April 05-08, 2016, Dubai, UAE.
18. Bahga, S.S., Chambers, R.D. and Santiago, J.G., "Interaction of ion-concentration in shock waves in microfluidics," *64th Annual Meeting of the American Physical Society/Division of Fluid Dynamics (APS/DFD)*, Baltimore, MD, November 20-22, 2011.
19. Bahga, S.S., R.D. Chambers, J.G. Santiago, "Coupled isotachophoretic preconcentration and electrophoretic separation using bidirectional isotachopheresis", *The Thermal and Fluid Sciences Affiliates and Sponsors Conference (TFSA 2011)*, Stanford, CA, February 2-4, 2011.
20. Bahga, S.S., Bercovici, M., Kaigala, G.V., Santiago, J.G., "Rapid chemical detection and identification in a hand held device", *The International Chemical Congress of Pacific Basin Societies 2010 (Pacifichem 2010)*, Honolulu, HI, USA, December 15-20, 2010.

1. “Physics and applications of electrohydrodynamic jet printing”, Keynote Talk at 4-th Biennial International Conference on Future Learning Aspects of Mechanical Engineering (FLAME - 2024), Amity University, Noida, July 31-August 2, 2024.
2. “High resolution printing with electrified liquid jets”, Seminar at ME Seminar Series, IIT Gandhinagar, April 5, 2024.
3. “Physics and Applications of Electrohydrodynamic Jet Printing”, Invited Talk at Perspectives in Hydrodynamics, IIT Bombay, Feb 26-28, 2024.
4. “Electrohydrodynamic Jet Printing: Physics and Applications”, Keynote Talk at Workshop on Interfacial Engineering at Multiple Spatio-temporal Scales, IISc Bangalore, Jan 29-31, 2024
5. “Electrohydrodynamic Instabilities in Microfluidic Devices”, Invited Talk at Kazan Federal University, Kazan, Russia, May 30, 2023
6. “Microfluidics: Applications of Electrohydrodynamics and Electrokinetics”, Invited Talk at Kazan National Research Technological University (KNTRU), Kazan, Russia, May 23, 2023.
7. Rapid prototyping of PDMS microchips using electrohydrodynamic jet printing, Invited Talk, One-day workshop on MEMS, NEMS and Microfluidics, 25th February 2023, IIT Delhi.
8. Isotachophoresis: Modelling and Experiments, Invited Lecture, GIAN course on Miniaturised Total Analysis Systems at Punjabi University, Patiala, January 13, 2023.
9. “Uncertainty quantification in modeling and simulations of thermo-fluid systems”, 7th National Workshop on Research Methodology in Fluid Mechanics, IIT Roorkee, June 13-17, 2022.
10. “Accelerated Bayesian inference based solution of inverse heat transfer problems using polynomial chaos expansions”, Keynote Talk, Second Asian Conference on Thermal Sciences, 2nd ACTS October 3-7, 2021.
11. “Electrohydrodynamic instability in microchip electrophoresis”, Chemical Engineering Seminar Series, IISc Bangalore, April 15, 2021.
12. “Electrohydrodynamic instabilities in microchip electrophoresis”, Indo-French workshop on recent advances in electrohydrodynamics (EHD)–applications in microfluidics, Nov 27-29, 2019.
13. “Electrohydrodynamics in Microsystems”, Pravartana 2019, IIT Kanpur, April 1, 2019.
14. “Microfluidic MEMS”, Futuristic Trends of Nano-Electronics, MEMS and NEMS(18th – 19th September, 2018)
15. “Electrohydrodynamic instabilities in microflows”, Mechanical Engineering Seminar Series, IISc Bangalore, Speaker Feb 17, 2017
16. “Electric field driven instability in microscale flows”, ME Seminar Series, IIT Delhi, September 21, 2016
17. “Microfluidics: Physics and Applications”, Living Science Foundation, July 23, 2016. (available on youtube.com)
18. “Shock waves in electrokinetics”, Seminar at Kyoto University, Japan, October 22, 2015.
19. Two lectures on lab-on-a-chip technologies and microfluidic MEMS in Workshop on MEMS Design Technology and Application held at ITM University Gurgaon, Lecture March 1-3, 2015.
20. ”Desalination using ion-concentration shock waves” at Indo-US Workshop on Recent Advances in Micro/Nanoscale Heat Transfer and Applications in Clean Energy Technologies during Dec 21-22, 2013 at IIT Ropar.
21. “Propagation and Interaction of Ion-Concentration Shock Waves in Microfluidics”, Invited Talk, IIT Bombay, Dec, 2011, Mumbai.

1. Santiago, Juan G., Robert D. Chambers, and Supreet Singh Bahga. "Isotachophoresis having interacting anionic and cationic shock waves." U.S. Patent No. 8,986,529. Granted 24 Mar. 2015.
2. Bahga, S.S., Srivastava, R.K., Singh, R., Yadav, Anilkumar L., Ajmera, S., Agarwal, A., Pradhan A., A microfluidic device and a method for fabricating a three-dimensional (3D) poly-high internal phase emulsions, Indian Patent No. 355686, Granted.
3. Srivastava, R.K., Nandan, B., Bahga, S.S., Archana, P., Sharma, E., Pal, J. "A process for preparation of multidimensional porous scaffold", Indian Patent No. 347028, Granted.
4. Bahga, S.S., Kondaraju, S., Agarwal, S., Patra, R., Gupta, P, Ankur, "A membrane-less variable focus liquid lens and an imaging device", Indian Patent No. 471854, Granted.
5. Khatait, J.P., Palani, S., Bahga, S.S., "Precision Nano-Imprinting Machine", Indian Patent No. 500727, Granted.
6. Bahga, S.S., Choubey, A., Dubey K., Singh, A.K, Srivastava, R., "A method and a system for producing master mold for microfluidic devices", Indian Patent Application, 202211056031, 2022, under examination.
7. Gupta, A., Bahga, S.S., Garg, R., Singh, I., Gupta, P., "Low-cost hardware for state-of-charge estimation of Li-ion cells using central difference Kalman filter", Indian Patent Application, 202311067119, 2023, under examination.

SPONSORED RESEARCH PROJECTS (EXTERNAL FUNDING)

S. No.	Project Title	PI/co-PI	Funding Agency	Budget (in Lakh Rs.)	Status
1	Investigation of Electrohydrodynamic Instabilities in Microscale Electrophoretic Processes	PI	DST-SERB	22.80	Completed
2	Uncertainty Quantification in Petroleum Reservoir Simulations	PI	ONGC	42.60	Completed
3	Condition monitoring and prediction of thermal runaway through experiments, numerical modeling and estimation of state-of-charge in Lithium-ion cells	co-PI	DST	90.48	Completed
4	Microfluidic Digital Holographic Microscopy Platform for Live Cell Imaging and Diagnostics	co-PI	DST	57.82	Completed
5	Development of a submicrometer resolution electrohydrodynamic jet printer for printing customized polymeric structures	PI	MHRD-SERB (IMPRINT-2)	75.37	Completed
6	Development of a numerical simulator for microfabricated electro-spray thrusters	PI	ISRO-RESPOND	26.29	Completed
7	To Initiate Boeing University Relationship Programme at the Institute and as a part of the Aerospace and Aeromodelling Activities among Students	co-PI	Boeing	83.6	Completed
8	An experimental exploration of efficient kinematics for next generation flapping wing unmanned aerial vehicles (FWUAVs)	co-PI	ARDB	31.7	Completed
9	Electrohydrodynamic jet printing for rapid prototyping of PDMS microfluidic devices	PI	SERB (CRG)	40.39	Ongoing
10	Floquet Analysis of Electro-Hydrodynamic Instabilities Driven by Time-Periodic Electric Field	PI	SERB (MATRICS)	6.6	Ongoing

SPONSORED RESEARCH PROJECTS (INTERNAL FUNDING)

S. No.	Project Title	PI/co-PI	Funding Scheme	Budget (in Lakh Rs.)	Status
1	High-fidelity Simulations of Microscale Electrokinetic Flows	PI	IRD, New Faculty Grant	1.0	Completed
2	UAVs for high altitude and high wind operations	PI	(IRD DL-1234 2018)	2.0	Completed
3	High-resolution electro-hydrodynamic jet printing for fabrication of customized polymeric structures	PI	FIRP 2018	10.0	Completed

CONSULTANCY PROJECTS

1. Review of automotive heat exchangers basics and design methods (as PI), funded by Halla-Visteon Climate Systems India Ltd. Budget: Rs. 3,37,080, Status: Completed.
2. Intelligent hydroponics using Spresense (as PI), funded by Sony India Software Centre Pvt. Ltd. Budget: Rs. 13,89,600, Status: Completed.
3. Development of a droplet-generation microfluidic device for cosmetics (as PI), funded by NG Electro Pvt. Ltd., Budget: Rs. 1,20,000, Status: Ongoing.
4. Propeller profile optimization for noise reduction in UAVs (as PI), funded by Botlab Dynamics Ltd., Budget: Rs. 4,20,000, Status: Ongoing.

SUPERVISED THESIS (COMPLETED)

PhD

S. No.	Student	Title	Year	Status/ Remarks
1	Manjinder Singh	Modelling of miniature heat pipes based on wettability gradient	2019	Defended
2	Nilesh D. Pawar	Growth dynamics of droplets on a solid surface during dropwise condensation (co-supervised with Profs. S.R. Kale and S. Kondaraju)	2019	Defended
3	Rattandeep Singh	Electrohydrodynamics of droplets in a microchannel (co-supervised with Prof. A. Gupta)	2019	Defended
4	Kaushlendra Dubey	Electrokinetic instabilities and non-uniform electroosmotic flow in microfluidic systems with conductivity gradients (co-supervised with Prof. A. Gupta)	2021	Defended
5	Sufia Khatoon	Inverse problems in thermo-fluid systems using polynomial chaos expansions and Bayesian inference (co-supervised with Prof. J. Phirani)	2022	Defended
6	Abhishek Kumar Singh	Physics of liquid jets in electrohydrodynamic jet printing (co-supervised with Prof. R. Srivastava)	2023	Defended
7	Yogesh Maheshbhai Patel	Holographic imaging flow cytometry using three-dimensional microfluidic hydrodynamic focusing	2024	Defended

MS(R)

S. No.	Student	Title	Year	Status/ Remarks
1	Surabhi Sharan	Electrohydrodynamic instability with collinear electric field and conductivity gradient	2017	Defended
2	Sanketh Ajmera	Numerical simulation of electrohydrodynamic flows with collinear conductivity gradient and electric field using pseudo-spectral method	2021	Defended
3	Sourabh Das	Modelling and experiments of deterministic lateral displacement devices with polygonal posts	2024	Defended

M.Tech.

S. No.	Student	Title	Year
1	Arun Yadav	Thermal analysis and design of microheat pipe	2015
2	Aditya Budaraju	Lattice Boltzmann simulation of imbibition in capillaries (co-supervised with Prof. S. Kondaraju)	2016
3	Rohit Mehta	Uncertainty quantification in modelling of micro-scale ion transport	2017
4	Vidushi	Lattice Boltzmann simulation of imbibition in capillaries	2017
5	Lt. Col. Vivek Bandal	Extreme weather clothing for the armed forces	2018
6	Mohit Pathak	Simulations of electrohydrodynamic instability in microchannel flow	2019
7	Sridhar Palani	Design and development of precision hot embossing machine (co-supervised with Prof. J. Khatait)	2019
8	Vivek Mohan	Numerical simulation electrospray thruster (co-supervised with Prof. A. Gupta)	2020
9	Lt. Col. Subhasis Sarkar	Micro-UAV for military applications (co-supervisor Prof. A. Gupta)	2020
10	Sanidhya Jain	Electrospray thruster for micro and nano satellites (co-supervised with Prof. A. Gupta)	2021
11	Praveen Sharma	Computational modeling of dispersion of SARS-COV2 in indoor spaces (co-supervised with Prof. A. Gupta)	2022
12	GK Ananthu	Modelling and simulation of electrospray thrusters (co-supervised Prof. A. Gupta)	2023

M.Tech.

S. No.	Student	Title	Year
13	Manish Tandon	Conjugate heat transfer analysis of forced air cooling of a lithium-ion battery module in inline and staggered configurations (co-supervised Prof. A. Gupta)	2023
14	Kshitij Dwivedi	Numerical simulations of multiphase flow in microfluidic devices (co-supervised Prof. A. Gupta)	2024
15	Thakur Ronith Singh	State of health estimation of Li-ion batteries using data driven models (co-supervised Prof. A. Gupta)	2024

B.Tech.

S. No.	Student(s)	Title	Year
1	Prateek Gupta	Stability analysis of electrophoretic systems	2015
2	Romir Moza, Mayank Khichar	Non-linear wave in nanochannel electrophoresis	2015
3	Aman Kumar Jha	Uncertainty quantification of microscale transport processes	2015
4	Piyush Gupta, Ankur Ankur	Design and fabrication of fluidic lens	2015
5	Rahul Gaur	Electrohydrodynamic instability of electrophoretic shock waves	2016
6	Sanketh Ajmera, Shivam Agarwal	Droplet microfluidic approach for fabricating porous polymeric constructs	2017
7	Prerit Mathur, Roshan Patra	Development of particle counting microfluidic device	2017
8	Apoorva Pradhan, Anant Sharma	Microfluidic digital holographic microscopy platform for cell counting	2018
9	Mohd. Babar	Non-linear waves in current monitoring method for measurement of electroosmotic flow	2019
10	Saksham Jain	Numerical modelling of electrohydrodynamic jets	2020
11	Namita Dudeja	Inverse Heat Transfer using Kalman Filtering	2021
12	Tarandeep Singh Thukral	Imbibition in microfluidic devices	2021
13	Alokik Gupta	Analysis of electrohydrodynamic instabilities driven by periodic electric field	2022

ONGOING THESIS SUPERVISION*Ph.D.*

1. Syed Twaha Irfan Ahmad, Multiphase flow in microfluidic devices (co-supervisor Prof. A. Gupta).
2. Prakash Saxena, Modelling of Li-ion batteries (co-supervisor Prof. A. Gupta).
3. Anupam Choubey, Experimental investigation of electrohydrodynamic jetting.
4. Raghvendra Gupta, Battery management system based on physics-based model of lithium-ion batteries (co-supervisor Prof. A. Gupta).

M.S.(R)

1. Subhrajyoti Paul, Electrohydrodynamic jet printing of polymeric solutions.

M.Tech.

1. Abhijeet, Propeller profile optimization for noise reduction in UAVs (co-supervisor Prof. P. Gupta).

TEACHING EXPERIENCE

2020-present

Associate Professor, Indian Institute of Technology Delhi

2013-2020

Assistant Professor, Indian Institute of Technology Delhi

1. *Course coordinator of the following courses:*

- i. MCL140 Engineering Thermodynamics, Semester I, 2020-21, 2021-22, 2022-23
- ii. MEL341: Gas Dynamics and Propulsion, Semester II, 2013-14
- iii. MEL441 Modelling and Experiments in Heat Transfer, Semester I, 2014-15
- iv. MEL341 Gas Dynamics and Propulsion, Semester II, 2014-15
- v. MEL715 Gas Dynamics, Semester I, 2015-16
- vi. MCQ302 Seminar Course – II, Semester II, 2015-16
- vii. MCL701 Advanced Thermodynamics, Semester I, 2016-17, 2017-18, 2018-19, 2023-24, 2024-25
- viii. MCL826 Introduction to Microfluidics, Semester II, 2016-17, 2017-18, 2018-19
- ix. NIN100 Introduction to Engineering, Semester I, 2019-20
- x. MCL705 Experimental Methods, Semester II, 2020-21, 2020-21, 2021-22
- xi. MCL813 Computational Heat Transfer, Semester II, 2022-23, 2023-24

2. *Assisted in delivering lectures and/or conducting laboratory sessions of the following courses:*

- i. MEL705 Experimental Methods in Thermal Engineering. I, 2013-14
- ii. MEL715 Gas Dynamics, Semester I, 2013-14
- iii. NIN100 Introduction to Engineering, Semester I, 2014-15, 2015-16, 2016-17
- iv. MCP301 Mechanical Engineering Lab – I, Semester II, 2015-16, 2016-17
- v. MCP401 Mechanical Engineering Laboratory – II, Semester II, 2016-17, 2017-18, 2018-19
- vi. MCL705 Experimental Methods, Semester II, 2018-19

3. *Co-Instructor of VLM107 Micro and Nano Fabrication in the Visionary Leadership for Manufacturing (VLFM) Programme in Semester II, 2017-18, 2018-19, 2019-20, 2022-23, 2023-24, Semester I, 2024-25*

2009-2012

Teaching Assistant, Stanford University, USA

1. ME354 Experimental Fluid Mechanics, Autumn 2009-2012, with Prof. Juan G. Santiago
2. ME457 Fluid Flow in Microdevices, Winter 2010-2011, with Prof. Juan G. Santiago

ADMINISTRATIVE EXPERIENCE

Department Level, Dept. of Mechanical Engineering, IIT Delhi

<i>2021-present</i>	Department stores in-charge
<i>2023-present</i>	Lab-in-charge of TESLA lab
<i>2019-2021</i>	Secretary of Department Research Committee (DRC)
<i>2016-2023</i>	Lab-in-charge of Micro and Nanofluidics Lab (II-372)
<i>2016-2018</i>	Secretary of Faculty Search Committee
<i>2016-2017</i>	Member of committee for shortlisting and Stage I seminar of faculty applicants of IIT Jammu.
<i>2015-2016</i>	Member of Faculty Search Committee
<i>2015-2016</i>	Member of M.Tech. Project Review Committee
<i>2015-2016</i>	Lab-in-charge of Heat Transfer Lab (II-372)
<i>2015-2016</i>	Faculty Coordinator of Mechanical Engineering Society
<i>2014-2015</i>	Member of Department Research Committee (DRC)
<i>2014-2015</i>	Member of B.Tech. Project Review Committee
<i>2013-2014</i>	Member of Mini Project Review Committee

Institute Level, IIT Delhi

<i>2023-present</i>	Member of Academic Progress Group
<i>2022-23</i>	Member of Core Committee on Curriculum Review and New Curriculum Implementation
<i>2018-2022</i>	Faculty Coordinator of Aeromodelling Club of IIT Delhi
<i>2013-2018</i>	Member of proctorial team to assist incoming UG students

1. Reviewed articles for the following archived journals:

- Nature
- Journal of Fluid Mechanics
- Physical Review Fluids
- Physics of Fluids
- Applied Physics Letters
- Proceedings of the Royal Society A
- Journal of Heat Transfer
- Analytical Chemistry
- Journal of Electrostatics
- Applied Thermal Engineering
- Applied Mathematical Modelling
- European Journal of Mechanics -B/Fluids
- Electrophoresis
- Journal of Chromatography A
- Nature Scientific Reports
- Soft Matter
- Advanced Powder Technology
- Chemical Engineering Communications
- Advances in Mechanical Engineering

2. Reviewed research proposals submitted to ECR scheme of DST, ISRO-IISc Space Technology Cell, and Wadhvani Research Center for Bioengineering, IIT Bombay.

3. Session Chair, COMPFLU-2018 (12th International Conference on Complex Fluids and Soft Matter), December 6 – 9, 2018, IIT Roorkee, Roorkee, India

4. Track Chair, 5th National and 3rd International ISHMT-ASTFE Heat and Mass Transfer Conference, December 28 – 31, 2019, IIT Roorkee, Roorkee, India