Resume

Gargi Das

Professor, Department of Chemical Engineering
Indian Institute of Technology, Kharagpur, India, 721302

Fax : (03222) 55303
Phone : (03222) 83952 (Office),
82917 (Res)
E-mail : gargi@che.iitkgp.ac.in

Date of Birth : 10.07.1965

Educational Background

Examination / Degree	**University / Institute**	**Year of Passing**	**% of Marks/ CGPA**	**Remarks**
Ph. D.	Indian Institute of Technology Kharagpur	1996	-	Doctoral Dissertation entitled "Some Hydrodynamics Aspects of Gas-Liquid Two-Phase Flow Through Concentric Annuli - ISCA Young Scientist Award in Engg. Sciences in 1995 based on doctoral research
M. Tech	Indian Institute of Technology Kharagpur	1989	CGPA - 9.12	Institute silver Medal as Departmental topper
B.Ch.E.	Jadavpur University, Kolkata	1988	85%	University Gold Medal as Departmental topper
H. S. W.B. Board)	Lady Brabourne College, Kolkata	1984	70%	-
I.C.S.E.	Ispat Public School, Rourkela	1982	90%	Merit Prize & SAIL Scholarship for First Position in Rourkela Township

Professional Experience

Position	**Institute**	**Period**	**Job Responsibility**
Professor	Dept. of Chem. Engg, Indian Institute of Technology Kharagpur	26.12.08 – till date	Teaching & Research
Professor and Head	-do-	1.1.2018 – 31.12.2020	Teaching, Research & Chairmanship of Dept.
Associate Professor	- do -	20.08.04 - 25.12.08	Teaching & Research
Assistant Professor	- do -	04.01.01 - 20.08.2004	Teaching & Research

BOYSCAST Fellow	School of Chemical, Environmental and Mining Engineering, University of Nottingham, UK	1.1.2000 to 31.12.2001	Research on two-phase flow through T-junction & related instrumentation
Lecturer	Haldia Institute of Technology, Haldia	09.12.1998 – 03.01.01	Teaching & Research
Research Associate (under CSIR Individual Scheme)	Indian Institute of Technology Kharagpur	1.8.95 – 8.12.1998	Research

Awards and Recognition

- **Dr G P Kane CHEMCON Distinguished Speaker Award** by IIChE the Indian Institute of Chemical Engineers in **2018**
- **AICTE Career Award** for Young Teachers for the year 2001-2002
- **BOYSCAST Fellowship**, 1999-2000 in Engineering Sciences for Research in the School of Chemical Environmental and Mining Engineering, University of Nottingham, Nottingham for a period of one year
- **Amar Dye-Chem Award** for Excellence in Research and Development for Chemical Engineer by the Indian Institute of Chemical Engineers for the year 1998
- **ISCA Young Scientist Award** in Engineering Sciences in the 82nd Session of Indian Science Congress held in January 1995
- Selected for **INSA – DFG Visiting Scientist program**, 2004-2005
- Received DST Young Scientist Project under (i) **DST Young Scientist (SERCYS) Scheme** in 1997 and (ii) **DST Fast Track Scheme** in 2003
- CSIR Research Associateship in 1995
- **Institute Silver Medal** in IIT Kharagpur in 1990 for securing First Position in M.Tech among Chemical Engineering students.
- **University Gold Medal** and **two other medals** at Jadavpur University in 1988 for securing First Position in B.Ch.E.
- **Merit Prize** and **SAIL Scholarship** in 1982 for securing First Position in Rourkela Township with 90% marks in ICSE.

Administration and Related

- HoD from 1.1.2017 to 31.12.2020
- **Key person in setting up inter-Institutional collaborative master's program (Executive MTech in Process Engineering) *for industry executives*, a first of its kind in India.**

  Program Coordinator from IIT Kharagpur from 2018 to December 2020
- Initiated and presently the Coordinator for joint certification courses for API manufacturing employees (Dr. Reddy's Laboratory) – Two courses completed
- Member PAC on "Chemical and Environmental Engineering" of the Science & Engineering Research Board (SERB) of DST till March 2021

- Chancellor's Nominee, Faculty Recruitment, Chemical Engineering, Jadavpur University from 2017 to till date
- Member, Academic Council of Ghani Khan Choudhury Institute of Engineering and Technology, Malda from 1.11.2017 to till date
- External Expert, Faculty Recruitment and Upgradation, Department of Applied Chemistry and Chemical Engineering (ACCE), Noakhali Science & Technology University, Bangladesh.

Teaching and Laboratory Development

Undergraduate

Chemical Engineering Thermodynamics, Process Instrumentation, Transport Phenomena, Process Heat Transfer, Process Equipment Design I (Design of Heat Transfer Equipment), Process Equipment Design II (Design of Mass Transfer Equipment)

Post graduate

Multiphase Flow, Biochemical Engineering

Developed a *research cum post graduate laboratory on Multiphase Flow* for doctoral and master's dissertation and post graduate laboratory classes

Revamped and upgraded the *Unit Operations Laboratory* housing Heat Transfer and Mass Transfer experiments for undergraduate students of Chemical Engineering, Instrumentation and Biotechnology

Educational Package

- Video course on **Principles and Practices of Process Equipment and Plant Design** under MOOCs (30 hours to commence from July 2021)
- Video course on **Phase equilibrium thermodynamics** under MOOCs (20 hours) [4th rerun completed in July-Sept. 2020]
- Video course on **Fundamentals of Multiphase Flow** under NPTEL (40 hours), also included in *Swayam Prabha* Channel 11 broadcast
- Video course on "**Tutorial/Problem Solving in Multiphase Flow**" for broadcasting in DTH SWAYAM Prabha Channel 11 (6 hours) amidst COVID 19 lockdown in 2020
- Web course on **Fundamentals of Multiphase Flow** under NPTEL
- Video course on **Adiabatic Two Phase Flow and Heat Transfer** under MOOCs (10 hours, second rerun from July 2021)

Research Interests
Transport processes, Multiphase flow involving Newtonian and non-Newtonian liquid, Process Intensification of heterogeneous reacting and non-reacting systems, CFD analysis

Current Research

- Process intensification of mass transfer controlled reacting and non-reacting systems
- Internal hydraulic jump through closed conduits – Experimentation and analysis
- Hydrodynamics of liquid-liquid and gas-liquid two phase flow through horizontal and vertical pipes, inclined systems, pipe fittings in reduced dimensions
- Hydrodynamics and sensor development for three phase (gas-liquid-liquid) systems
- Multiphase flow involving non-Newtonian liquids
- Development of suitable instrumentation techniques to analyse gas-liquid and liquid-liquid flow systems.
- Development of photographic and image processing techniques for multiphase flow analysis.
- Lubricated transportation (core-annular flow) of high viscous oil
- Computing techniques for two phase flow

Doctoral Thesis Supervision: 8 completed, 5 ongoing

Publications

Book
Undergraduate text book: "Process Equipment and Plant Design - Principles and Practices", Subhabrata Ray, **Gargi Das**; **ISBN:** 9780128148853; 1st Edn., May 2020, Elsevier Inc.
(*Well Appreciated in international professional arena*)

Research monograph:

- Hydrodynamics of gas-liquid-liquid upflow, Tanumoy Mukherjee, **Gargi Das**, Subhabrata Ray; (**ISBN**: 978-3-659-28996-5, 2012, LAP Lambert Academic Publishing)
- Liquid-liquid flow through pipe and pipe fittings, S. Ghosh, **G. Das**, P. K. Das, Lap Publishing, Saarbrücken, Germany, 2013.

Book Chapters
Impedance Techniques for the measurement of two phase flow parameters-Possibilities and Challenges, P.K.Das, **G.Das**, S.Sen, K.Das in Computerised Tomography for Scientists and Engineers, (Published by: CRC Press 2007)

Development and Application of Wire Mesh Tomography for Gas-Liquid Systems, P. Ghoshal, F. Sinha, S. Sen, P. K. Das and **G. Das** in CT2008: Tomography Confluence:

An International Conference on the Applications of Computerized Tomography (Published by: American Institute of Physics 2008)

Historical Note
Gargi Das (2020), "Kadambini Ganguly: A Forgotten Legend", Indian Journal of History of Science, Vol 55, No 3, pp. 264-268.

Research Publications in Referred Journals

1. Alex Koshy, Subhabrata Ray, and Gargi Das (2021), "Between droplets and fluid thread - the role of gravity in meso-scale flow", **Physics of Fluids** (Accepted)
2. M. Dhar, S. Ray, G. Das, and P. K. Das, (2021), "Modulation of viscous planar jump by an obstacle in the flow path -Interrogation through shallow water equations and numerical analysis" **Physics of Fluids,** 33, 053609 1-13. Impact Factor: 3.514.

3. M. Dhar, S. Ray, G. Das, and P. K. Das, (2021), "Internal hydraulic jump in plane Poiseuille two-layer flow: Theoretical, numerical and experimental study**," J. Fluid Mech.** 912, A45 1-20. Impact Factor: 3.354.

4. Kumar, Amit, Das, Gargi, Ray, Subhabrata, Jha, Jay Mant, Thakur, Amit K. and Panda, Swapna Rekha (2021), "Gas-liquid downward flow through narrow vertical conduits: effect of angle of entry and tube-diameter on flow patterns" *International Journal of Chemical Reactor Engineering*, https://doi.org/10.1515/ijcre-2020-0164. Impact Factor: 1.152.

5. Dhar, M., Das, G. & Das, P. K. (2020), Planar hydraulic jumps in thin film flow. **J. Fluid Mech**. **884**, A11 1-26. Impact Factor: 3.354.

6. Kumar, A., Ray, S., & Das, G. (2018), Draining phenomenon in closed narrow tubes pierced at the top: an experimental and theoretical analysis, **Nature Scientific Reports,** 8:14114, 1-11. Impact Factor: 3.998.

7. Kumar, A., Bhowmik, S., Ray, S., & Das, G. (2017), Flow pattern transition in gas-liquid downflow through narrow vertical tubes. **AIChE Journal**, 63(2), 792-800. Impact Factor: 3.519.

8. Maiti R., Das G., Das P. K, (2017), Granular drainage from a quasi-2D rectangular silo through two orifices symmetrically and asymmetrically placed at the bottom, **Physics of Fluids**, 1-17. Impact Factor: 3.514.

9. Kumar, A., Das, G., & Ray, S. (2017), Void Fraction and Pressure Drop in Gas-Liquid Downflow through Narrow Vertical Conduits-Experiments and Analysis. **Chemical Engineering Science**, 171, 117–130. Impact Factor: 3.871.

10. Sumana Ghosh, Gargi Das, Prasanta Kumar Das, (2016,) Liquid buckling in a practical situation, **IOP Science Euro Physics Letters**, 115, 44004. Impact Factor: 1.958.

11. Maiti, R., Das, G., and Das, P. K. (2016), Experiments on eccentric granular discharge from a quasi-two-dimensional silo, **Powder Technology**, 301, 1054–1066. Impact Factor: 4.142.

12. R. Maity, S. Meena, G. Das and P.K. Das, (2016), Flow field during eccentric discharge from quasi-two dimensional silos –extension of the kinematic model with validation. **AIChE J,** 62 (5), 1439-1453. Impact Factor: 3.519.

13. Kannan Aadithya, Ray Subhabrata, Das, Gargi, (2016), Liquid-Liquid Flow Patterns in Reduced Dimension Based on Energy Minimization Approach **AIChE** J 62(1), 287-294. Impact Factor: 3.519.

14. K.G. Biswas, G. Das, S. Ray, J.K. Basu, (2015), A simple flow device for enhanced mass transfer in reduced dimensions, **Chem. Eng. Jl,** 279 973-982. Impact Factor: 10.652.

15. K.G. Biswas, S. Majumdar, G. Das, S. Ray, (2015), The influence of bends on liquid-liquid flow through reduced dimensions, **Chem. Eng. Jl.,** 281, 995-1007. Impact Factor: 10.652.

16. K.G. Biswas, G. Das, S.Ray, J.K. Basu, (2015), Mass transfer characteristics of liquid-liquid flow in small diameter conduits, **Chem. Eng. Sci**. 122 652-661. Impact Factor: 3.871.

17. K.G. Biswas, R. Patra, G. Das, S. Ray, J.K. Basu, (2015), Effect of flow orientation on liquid-liquid slug flow in a capillary tube, **Chem. Eng. J.** 262 436-446. Impact Factor: 10.652.

18. K.G. Biswas, G. Das, S. Ray, J.K. Basu, (2015), The use of bends for enhanced mass transfer during liquid-liquid flow through milli channels, **Int. J. Heat Mass Tran.**84 876-892. Impact Factor: 4.947.

19. T. Mukherjee, G. Das, S. Ray, (2014), Sensor-based flow pattern detection – gas-liquid-liquid upflow through a vertical pipe, **AIChE** J 60 3362-3375. Impact Factor: 3.519.

20. A. Kundu, J.K. Basu, G. Das, (2012), A novel gas-liquid contactor for chemisorption of CO_2, **Separation and Purification Technology**, 94, 115-123. Impact Factor: 5.774.

21. V. V. R. Kaushik, S. Ghosh, G. Das, P. K. Das, (2012), Simulation of core annular in sudden contraction and expansion - A comprehensive CFD study, **Journal of Petroleum Science and Engineering**, 86, 153-164. Impact Factor: 3.706.

22. S. Ghosh, G. Das, P. K. Das, (2012), Inception and termination of the core annular pattern during oil-water downflow through a vertical pipe, **AIChE Journal**, 58,7. Impact Factor: 3.519.

23. M. Sharma, P. Ravi, S. Ghosh, G. Das, P. K. Das, (2011), Hydrodynamics of lube oil-water flow through 180^0 return bends, **Chemical Engineering Science**, 66(20), 4468-4476. Impact Factor: 3.871.

24. S. Ghosh, G. Das, P. K. Das, (2011),Simulation of core annular in return bends – A comprehensive CFD study, **Chemical Engineering Research and Design**, 89(11), 2244-2253. Impact Factor: 3.350.

25. M. Sharma, P. Ravi, S. Ghosh, G. Das, P. K. Das, (2011), "Studies on low viscous oil-water flow through return bends", **Experimental Thermal and Fluid Science**, 35(3), 455-469. Impact Factor: 3.444.

26. S. Ghosh, G. Das, P. K. Das, (2011),"Pressure drop analysis for liquid-liquid downflow through vertical pipe", **Journal of Fluid Engineering**, 133, 011202.1-011202.10. Impact Factor: 2.056.

27. V. V. R. Kaushik, S. Ghosh, G. Das, P. K. Das, (2011) "CFD modeling of water flow through sudden contraction and expansion in a horizontal pipe", **Chemical Engineering Education** 45(1),Winter, 30-36. Impact Factor: 0.38.

28. P. Mondal, S. Ghosh, G. Das, S. Ray, (2010), "Phase inversion and mass transfer during liquid–liquid dispersed flow through mini-channel", **Chemical Engineering and Processing: Process Intensification,** 49(10), 1051-1067. Impact Factor: 3.731.

29. S. Ghosh, G. Das, P.K.Das,(2010), "Simulation of core annular downflow through CFD- A comprehensive study", **Chemical Engineering and Processing: Process Intensification**, 49(11), 1222-1228. Impact Factor: 3.731.

30. T. K. Mandal**,** G. Das, P.K. Das, (2010), "An appraisal of liquid–liquid slug flow in different pipe orientations", **International Journal of Multiphase Flow**,36, 661-671. Impact Factor: 3.083.

31. B. De, T.K. Mandal, G. Das, (2010), "The rivulet flow pattern during oil–water horizontal flow through a 12 mm pipe", **Experimental Thermal and Fluid Science**, 34 (5), pp 625–632. Impact Factor: 3.444.

32. Y. K. Summan, T. K. Mandal and G. Das, (2010), "Use of digital signal analysis to identify slug flow in a narrow vertical pipe", **Chemical Engineering Communications**, 197 (10), pp1-16. Impact Factor: 1.982.

33. S.Ghosh ,T.K.Mondal , G.Das and P.K.Das, (2009),"Review of oil water core annular flow", **Renewable & Sustainable Energy Reviews** 13, pp. 1957-1965. Impact Factor: 12.110.

34. S. Bhusan, S. Ghosh, G. Das and P. K. Das, (2009),"Rise of Taylor bubbles through narrow rectangular channels", **Chemical Engineering Journal**, 155, pp 326-332. Impact Factor: 10.652.

35. T. Balakhrishna, S.Ghosh, G.Das and P.K.Das, (2010) "Oil-Water flows through Sudden Contraction and Expansion in a horizontal pipe –Phase distribution & Pressure drop", **International journal of Multiphase flow**, 36, pp13-24. Impact Factor: 3.083.

36. D.P.Chakraborty, G.Das, P.K.Das," (2009), "Liquid-liquid two phase flow through an orifice" **Chemical Engg Communication**, 1563-5201, 196, No 9, pp. 1117 – 1129. Impact Factor: 1.982.

37. T. K. Mandal, G. Das, P. K. Das, (2009) "Liquid Taylor Bubbles Rising in a Vertical Column of a Heavier Liquid – An Approximate Analysis" **Trans ASME, Journal of Fluids Engg**, 131, pp. 011303-1-11303-7. Impact Factor: 2.056.

38. A.K. Jana, G. Das, P. K. Das, (2008),"The hydrodynamics of liquid-liquid upflow through a venturimeter**", Int J Multiphase Flow**, 34 , pp.1119-1129. Impact Factor: 3.083.

39. T. K. Mandal, G. Das, P. K. Das, (2008) "Motion of Taylor bubbles and Taylor drops in liquid-liquid systems". **Industrial and Engineering Chemistry Research**, 47, No 18, pp. 7048-7057. Impact Factor: 3.854.

40. T. K. Mandal, M.Bhuyan, G. Das and P.K. Das (2008), "Effect of undulation on gas-liquid two-phase flow through a horizontal pipeline", **Chemical Engineering Research and Design,** 86, No 3, pp 269-278. Impact Factor: 3.350.

41. T.K.Mandal, A.K.Jana, R.Patra and G.Das (2007), " Hydrodynamics of Intermittent flow through small diameter vertical pipe during liquid-liquid two phase flow", **Int J Chemical Sci**, 5, No4, pp 1701-1711.

42. T.K. Mandal, G. Das, and P.K. Das, (2007) "Prediction of rise velocity of a liquid Taylor bubble in vertical tube", **Physics of Fluids**, 19, 128109, pp1-4. Impact Factor: 3.514.

43. V. Agarwal, A. K. Jana, G. Das, P. K. Das, (2007) "Taylor bubbles in liquid filled annuli – some new observations", **Physics of Fluids**, 19, 108105, pp1-4. Impact Factor: 3.514.

44. A.K. Jana, P. Ghoshal, G. Das, P. K. Das, (2007) "An analysis of pressure drop and holdup for liquid-liquid upflow through vertical pipes", **Chemical Engineering and Technology,** 30, No.7, pp. 920-925. Impact Factor: 1.543.

45. T. K. Mandal, D. P. Chakrabarti, G. Das, (2007) "Oil-water flow through different diameter pipes - similarities and dissimilarities", **Chemical Engineering Research and Design**, 85 (A4), pp.1-7. Impact Factor: 3.350.

46. A. K. Jana, T. K. Mandal, D. P. Chakrabarti, G. Das, P. K. Das, (2007) "An optical probe for liquid-liquid two-phase flows", **Measurement Science and Technology**, 18, pp. 1562-1575. Impact Factor: 1.861.

47. D. P. Chakrabarti, G. Das, P. K. Das, (2007), "Identification of stratified liquid-liquid flow through horizontal pipes by a non-intrusive optical probe", **Chemical Engineering Science**, 62, No 7, pp. 1861-1876. Impact Factor: 3.871.

48. D. P. Chakrabarti, G. Das, P. K. Das, (2006) ,"The transition from water continuous to oil continuous flow pattern" **AIChE Journal** 52, Issue 11, pp. 3668-3678. Impact Factor: 3.519.

49. H.Sharma, G.Das, A.N.Samanta, (2006), "ANN-Based Prediction of two phase gas-liquid Flow patterns in a circular conduit", **AIChE Journal**,52, No.9, pp. 3018-3028. Impact Factor: 3.519.

50. Ashish Kumar, G. Das and S. Dasgupta, (2007), "An approximate analysis to predict the interface shape for stratified two-phase systems in a square geometry", **International Journal of Transport Phenomena**, 8, pp. 359-370.

51. S. Pandey, A. Gupta, D. P. Chakrabarti, G. Das and S. Ray, (2006), "Liquid-liquid two phase flow through a horizontal T junction", **Chemical Engineering Research and Desig*n***, 84 (A10), pp.895-904. Impact Factor: 3.350**.**

52. D. P. Chakrabarti, P. Ghoshal, G. Das, (2006) "Behaviour of pressure gradient and transient pressure signals during liquid-liquid two phase flow", **Chemical Engineering & Technology**, 29, 10, pp. 1183-1195. Impact Factor: 1.543.

53. A. K. Jana, G. Das, P. K. Das, (2006), "A novel technique to identify flow patterns during liquid-liquid two-phase upflow through a vertical pipe", **Industrial and Engineering Chemistry Research**, 45, pp.2381-2393. Impact Factor: 3.854.

54. A. K. Jana, G. Das, P. K. Das, (2006) "Flow regime identification of two-phase liquid-liquid upflow through vertical pipe", **Chemical Engineering Science,** 61, 5, pp.1500-1515. Impact Factor: 3.871.

55. D. P. Chakrabarti, G. Das, S. Ray, (2005) "Pressure Drop in Liquid-Liquid Two Phase Horizontal Flow: Experiments and Prediction" **Chemical Engineering & Technology**, 28, 9, pp 1003-1009. Impact Factor: 1.543.

56. T. Sunder Raj, D. P. Chakrabarti, G. Das, (2005) "Liquid–Liquid Stratified Flow through Horizontal Conduit", **Chemical Engineering & Technology**, 28, 8, pp 899-907. Impact Factor: 1.543.

57. G. Das, P.K. Das and B.J. Azzopardi, (2005) "The Split of Stratified Gas-Liquid Flow at a Small Diameter T-junction", **Int. J. Multiphase Flow**, 31, 4, pp. 514-528. Impact Factor: 3.083.

58. G. Das, P. K. Das, N. K. Purohit and A. K. Mitra, (2001) "Geometry of Taylor Bubbles Rising Through Liquid Filled Annuli", **AIChE Journal**, 48, 2, pp. 411-416. Impact Factor: 3.519.

59. G. Das, P. K. Das, N. K. Purohit and A. K. Mitra, (2000), "Phase Distribution of Gas-Liquid Mixture in Concentric Annuli - Inception and Termination of Asymmetry", **Int. J. Multiphase Flow**, 26, pp.857-876. Impact Factor: 3.083.

60. G. Das, P. K. Das, N. K. Purohit and A. K. Mitra, (1999) "Flow Pattern Transition During Gas Liquid UpFlow Through Vertical Concentric Annuli Part I Experimental Investigations, **Trans. ASME, Journal of Fluids Engineering**, 121, pp. 895-901. Impact Factor: 2.056.

61. G. Das, P. K. Das, N. K. Purohit and A. K. Mitra, (1999) "Flow Pattern Transition During Gas Liquid UpFlow Through Vertical Concentric Annuli Part II Mathematical Models, **Trans. ASME, Journal of Fluids Engineering**, 121, pp. 902-907. Impact Factor: 2.056.

62. G. Das, P. K. Das, N. K. Purohit and A. K. Mitra (1998), "Rise of Taylor Bubbles Through Concentric Annuli", **Chem. Engg. Science,** 53, 5, pp. 977-995. Impact Factor: 3.871.

63. G. Das, P. K. Das, N. K. Purohit and A. K. Mitra, (2002) "Holdup of Gas-Liquid Mixtures in Concentric Annuli", **Canadian Journal of Chemical Engineering,** 80, 1, pp. 153-157. Impact Factor: 1.687.

64. G. Saha, N. K. Purohit and A. K. Mitra (1992), "Spherical Particle Terminal Settling Velocity and Drag in Bingham Liquids", **Int. J. Mineral Processing,** 36, pp. 273-281. Impact Factor: 4.035.

65. G. Das, K. C. Ghanta, N. K. Purohit and A. K. Mitra (1997), "Friction Factor for Flow of Bingham Plastic Fluid in Pipes", **Indian Chemical Engineer**, Section A, 39, 2, pp. 120-123. Impact Factor: 1.09.

Patents

Optical Probe for Multiphase Flow
Application no.: 915/Kol/2005
Assignee: D. P. Chakrabarti, G.Das, P. K. Das

Separator-collector for thin oil layers floating on water
Application no.: 0795/KOL/2015
Assignee: Anshul Paliwal, S. Ray, G. Das

A simple continuous flow device for process intensification in millimetre size conduits
Application no.: 990/Kol/2013
Assignee: K.G. Biswas, J.K.Basu, S. Ray, G. Das

An online device for in-situ measurement of low gas flow rates
Assignee: P.N.Dange, G.Das, P.K.Das, Rahul Raj
(Approved by TIFAC for filing)

Sponsored Projects

Title of the project: Flow Regime Transitions in liquid-liquid and gas-liquid- liquid horizontal flow by (a) neurofuzzy (b) mechanistic analysis
Funding agency: AICTE, New Delhi, (AICTE Career Award for Young Teachers)
Amount of grant: Rs. 3,00,000/-, *Duration:* 3 years, w.e.f. 1.10.2001

Title of the project: The split of a liquid-liquid two phase mixture at a horizontal dividing T junction – Experimentation and analysis
Funding agency: IIT, Kharagpur, under ISIRD Scheme for Young Teachers
Amount of grant: Rs.1,00,000/-, *Duration*: 1 years, w.e.f. 16.06.2001

Title of the project: Flow visualization and theoretical modelling of liquid-liquid and gas-liquid-liquid flow through vertical and inclined conduits
Funding agency: DST under the Fast Track Scheme
Amount of grant: Rs, 7,32,000/- *Duration:* 3 years w.e.f. 01.08.03

Title of the project: CFD Analysis and Flow visualisation of gas-liquid flow through a nozzle and subsequent spray
Funding agency: MHRD
Amount of grant: Rs.7,00,000/- *Duration*: 1 years, w.e.f. 16.06.2001

Title of the project: Investigations on oil-water core-annular flow through experiments and theoretical analysis for the production and processing of heavy oils
Funding agency: IIT, Kharagpur, under the Mission Project
Amount of grant: Rs.1, 00,000 *Duration*: 3 years, w.e.f. 2003

Title of the project: Development of sensors for gas-liquid and liquid-liquid two phase flow.
Funding agency: MHRD
Amount of grant: Rs. 14,00,000/- *Duration:* 3 years w.e.f. 01.07.05

Title of the project: Water lubricated transport of heavy oils– experimentation and theory
Funding agency: DST
Amount of grant: Rs. 19,00,000/- *Duration:* 3 years w.e.f.01.12.06

Title of the project: Experimental Investigations and theoretical Analysis of Internal Hydraulic Jump in closed conduits
Funding agency: DST
Amount of grant: Rs. 45,00,000/- *Duration:* 3 years w.e.f. Sept 2012

Conference Publications

Investigating the effects of flow pulsation on liquid-liquid two phase flow through Millimetre size conduits, Abir Chakravorty, Gargi Das*, Subhabrata Ray, *6th International & 43rd National Conference on Fluid Mechanics and Fluid power (FMFP 2016)(Paper no. 109).*

Effect Of In-Flow Pulsations On Liquid-Liquid Two Phase Downflow Through Millimeter Size Channels And Simultaneous Development Of Slug Characteristics,AbirChakravorty, Subhrajit Mukherjee, Gargi Das*, Subhabrata Ray,*Indian Chemical Engineering Congress 2016, 69 Annual Session of Indian Institute of Chemical Engineers (CHEMCON 2016) (Abstract no.88)*

Flow pulsation Induced Process Intensification in Liquid-liquid Milli-Contactors, Gargi Das, Abir Chakravorty, Subhabrata Ray, *International Conference on Catalysis and Chemical Engineering, (CCE-2017).*

Maiti, R., Das, G., and Das, P. K. (2013a), Pattern formation during outflow of granular material from a narrow rectangular conduit, In: 8th International Conference on Multiphas Flow, Jeju, Korea, May 26-31. pp 1–6.

Maiti, R., Sardar, S. K., Das, G., and Das, P. K. (2013b), An Investigation on Flow Pattern and Velocity Fields in a Two Dimensional Flat Bottomed Rectangular Silo with Central and Off-centre Discharge, In: International Conference on Powder, Granule and Bulk Solids: Innovations and Applications,Thapar University, Patiala, India, November 28-30.

Maiti, R., Das, G., and Das, P. K. (2016a), A Qualitative Assessment of Different Regimes during Concentric and Eccentric Discharge a Silo, In: Fluid Mechanics and Fluid Power – Contemporary Research. Springer, pp 1617–1626

K.G. Biswas, S. Srivastava, S. Ray, J.K. Basu, G. Das, Mass Transfer during liquid-liquid slug flow through millimeter size channels, CHEMCON 2011.

K.G. Biswas, R.V. Chakradhar, J.K. Basu, G. Das, Hydrodynamic Investigation of Gas-Liquid flow through pipe fittings in mill channels, SCHEMCON 2012.

K.G. Biswas, S. Majumdar, J.K. Basu, G. Das, Liquid-Liquid flow through tubes and tube fittings in milli channels, CHEMCON 2012.

K.G. Biswas, J. K. Basu, S. Ray, G. Das, Interrogating the effect of bends on liquid-liquid slug flow in capillaries – a means for process intensification, International Conference of Multiphase Flow (ICMF) 2013.

K.G. Biswas, J. K. Basu, S. Ray, and G. Das, Process intensification in liquid-liquid slug flow through capillaries, Heat and Mass transfer conference (ASME-ISHMT) 2013.

K.G. Biswas, M. Thakur, G. Das, J.K. Basu, Liquid-Liquid slug flow through helical coils - a means of process intensification, CHEMCON 2013.

S. Ghosh, G. Das and P. K. Das, "Hydrodynamics of lube oil-water downflow through a vertical pipe" International Conference on Multiphase Flow 2010 (ICMF-2010) Tampa, Florida, USA, May 30 to June 4, 2010.

P. Ravi, M. Sharma S. Ghosh, G. Das and P. K. Das "Effect of Return Bends on Kerosene-Water Flow Through a Horizontal Pipe" International Conference on Multiphase Flow 2010 (ICMF-2010) Tampa, Florida, USA, May 30 to June 4, 2010.

P. Mondal, S. Ghosh, G. Das, "Phase Inversion during Liquid - Liquid Flows and Its Influence on Mass Transfer Characteristics", ISHMT-ASME Heat and Mass Transfer Conference, Mumbai, India, January 4-6, 2010.

P.Ravi, M. Sharma, S. Ghosh, G. Das and P.K. Das, "Effect of return bends on oil-water flows through a horizontal pipe" CHEMCON,Visakhapatnam, India, December 27-30, 2009.

P.Ravi, M. Sharma, S. Ghosh, G. Das and P. K. Das," Effect of return bends on kerosene-water flows through a horizontal pipe", Young Researcher Conference 2009, Mumbai, India, January 27-29, 2009.

P.Ravi, Mukesh Sharma, S. Ghosh, G. Das and P. K. Das, "Effect of return bends on kerosene-water flows through a horizontal pipe", Young Researcher Conference 2009, Mumbai, India , January 27-29,2009.

P. Mondal, S. Ghosh and G. Das, "Studies on liquid-liquid flow patterns and their influence on mass transfer characteristics", *Communicated*, CHEMCON, Visakhapatnam, India, December 27-30, 2009.

P.Ravi, M. Sharma, S. Ghosh, G. Das and P. K. Das**, "**Effect of return bends on oil-water flows through a horizontal pipe**"** *Communicated*, CHEMCON ,Visakhapatnam, India, December 27-30, 2009.

A.K. Das, P.K. Das and G. Das, "Constructal Pattern Formation of a Fluid Network: A Preliminary Investigation" Proceedings of the 4th BSME-ASME IntConf on Thermal Engg, 27-29 Dec, 2008, Dhaka, Bangladesh

T. K. Mandal, G. Das, P. K. Das, "Liquid-liquid two-phase flow through undulating pipelines". Presented in International Conference of Multiphase Flow. Leipzig, Germany, July 2007.

T. K. Mandal,Y. K. Suman, G. Das, "Use of digital signal analysis to identify slug in narrow vertical pipe", Presentation in 8th International conference on gas-liquid and gas-liquid-solid reactor engineering, Delhi, India, December 2007

P. Ghoshal, F. Sinha, S. Sen, P. K. Das and G. Das , "Development of Wire Mesh Tomography for Gas-Liquid Systems" 8th International conference on gas-liquid and gas-liquid-solid reactor engineering' Delhi, India, December 2007

S.Bhusan, A. K. Jana, S. Ghosh, G. Dasand P. K. Das, Gas-liquid two phase flow through narrow rectangular channel, Presented in CHEMCON- 2007

H.Varshney, S.Ghosh, G.Das, P.K.Das,Experimental Study of Wall Shear in an Airlift Loop Reactor, Presented in CHEMCON- 2007

P. Ghoshal, S.Sen, P.K. Das, G. Das "Tomographic Characterization Of Two Phase Flow Across Constriction," Presented in CHEMCON- 2007

T. K. Mandal, A. K. Jana, R. Patra, G. Das, **"**Hydrodynamics of intermittent flow through small Diameter vertical pipe during liquid-liquid two-phase flow", NCFCE-2007.

T. K. Mandal, A. K. Jana, R. Patra and G. Das ," Identification of flow regime of liquid-liquid two-phase flow through narrow vertical pipe" CHEMCON 2007.

T. K. Mandal, M. K. Bhuyan, G. Das, P. K. Das., "Flow Characteristics in a Hilly Terrain Pipeline during Gas-Liquid Two-Phase Flow." Published in the proceedings of 59th annual session of the Indian Institute of The Chemical Engineers, 27 - 30 December' 2006, Ankleshwar, India.

T.K. Mandal, G. Das, P.K. Das., "The Rise of Taylor Bubbles in Liquid-Liquid Systems", Published in the proceedings of 58th annual session of the Indian Institute of The Chemical Engineers, 14 - 17 December' 2005, Delhi, India.

D. P.Chakraborty and G.Das, "The stratified configuration of Liquid-liquid flows through horizontal Conduits" Presented in CHEMCON 2004.

P.Ghoshal, D. P.Chakraborty and G. Das, "Flow Regime Identification from Pressure signals in Liquid-liquid two phase Horizontal flow", Presented in FMFP, 2004.

P.K.Das, G.Das, S.Sen and K. Biswas, "Impedance technique for the measurement of two phase parameters-possibilities and challenges", Presented on Workshop on Tomography, IIT Kanpur, 13-15 Feb, 2004.

D. P. Chakroborty, T. Sunder Raj, G. Das, "Liquid–liquid stratified flow through horizontal conduits" Presented at the Third International Conference on Theoretical Applied, Computational and Experimental Mechanics (ICTACEM), 2004.

A.K. Jana, and G. Das, " Liquid – Liquid Dispersed Flow Through Vertical Pipes" Presented in the 57th annual session of the Indian Institute of The Chemical Engineers 27 - 30 December' 2004. (CHEMCON-2004)

T. K. Mandal, D. P. Chakrabarti, G. Das, "Identification of the flow regime in small diameter pipe and comparison with large diameter pipes", Published in the proceedings of 1st National Conference of Research Scholars and Young Scientists in Chemical Engineering held in IIT,Kharagpur India from 25th –27th 'Sept'2004.

A.K. Jana, and G. Das, "Phase inversion in liquid – liquid two phase up flow in vertical pipe", Published in the proceedings of 1st National Conference of Research Scholars and Young Scientists in Chemical Engineering held in IIT, Kharagpur, India, 25th –27th September 2004.

D. P. Chakrabarti, A. K. Jana, G. Das, "The stratified flow during liquid–liquid flows through horizontal circular pipes", Published in the proceedings of 1st National Conference of Research Scholars and Young Scientists in Chemical Engineering held in IIT, Kharagpur, India, 25th –27th September 2004.

V Agarwal and G Das, "Taylor bubble characteristics in annuli with extreme value of diameter ratio", Presented at PRODIGY-2003, organized by University Institute of Chemical Technology (UICT), Mumbai under the IIChE Students Chapter in 2003

G. Das, P. K. Das and B. J. Azzopardi "The Division of Stratified flow at a small diameter T-junction", Presentated at the International Conference on Multiphase Flow, New Orleans, USA in May-June 2001.

G. Das and P. K. Das, "A Novel Conductivity Probe for Measurement of two phase flow parameters in an Annulus", Presented in the National Conference of Heat and Mass Transfer in Kolkata from 3rd to 5th Jan. 2002.

G. Das (1995), "Some Hydrodynamic Aspects of Two Phase Flow Through a Vertical Concentric Annulus", Presented in the 82nd Session of Indian Science Congress under the Young Scientist Programme in the Engineering Science Section.

G. Das, N. K. Purohit, A. K. Mitra and P. K. Das (1994), "Hydrodynamics of Single Bubble Rising in Stagnant Columns of Water", Presented in the Chemical Engineering Congress held at IIT Kharagpur in December 1994.

G. Das, P. K. Das, N. K. Purohit and A. K. Mitra, "Churn Flow Through Concentric Annulus", Presented at the Chemical Engineering Congress held in December 1995.

G. Das, P. K. Das and M. N. Biswas, "Two Phase Hydrodynamics in the Downcomer of an External Loop ALR", Presented at CHEMCON'96.

Selected Invited Talks (2017-till date)

- Internal hydraulic jump and drop in two phase gas-liquid flow over an obstacle, M. Dhar, G. Das & P. K. Das, AICHE Conference, Pittsburgh, 28th Ocober-2nd November, 2018.
- Hydraulic jumps and drops across obstacles, COMFLU conference. IIT Roorkee, 6th – 9th December, 2018.
- Tweaking the hydrodynamics to promote Process Intensification, Invited Talk for CHEMCON Distinguished Speaker Award, NIT Jalandhar, 26th – 28th December, 2018
- Physics of draining in the meso-scale: Experimental and theoretical analysis: IITG in 2018
- The Phenomenon of Liquid Draining in the Mesoscale: RGIPT as Chief guest on RS Day on 17.3.2018
- Draining phenomenon in closed narrow tubes pierced at the top: an experimental and theoretical analysis, Invited Talk in the weekly Lecture Series in IIT Roorkee on 05.02. 2018
- Intensifying Processes – Chemical and Biochemical – University of Georgia, Athens in 2017
- Theoretical modelling of macro and micro multiphase system in the Short term training program on Modelling and simulations of micro and macro multiphase systems (MS3MS - 2019) in NITK
- Experimental analysis of multiphase systems in the Short term training program on Modelling and simulations of micro and macro multiphase systems (MS3MS - 2019) in NITK