

## Detailed CV of PI

Name and full correspondence address

**Dr. Debopam Das**

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Institution: Indian Institute of Technology Kanpur

Date of Birth : 19-10-1967

Gender (M/F/T) : M

Category Gen/SC/ST/OBC : Gen

Whether differently abled (Yes/No) No.

### **Research Interest:**

#### **Incompressible Flow:**

Unsteady Aerodynamics, Flapping flight, Instability and Transition, Internal unsteady flows, Vortex Ring, Buoyant free shear flows.

**Compressible Flow:** Compressible vortex ring, Vortex wall & Shock-vortex interaction, Transient supersonic jets and aero-acoustics.

**Optical measurement techniques:** PIV, PLIF, BOS and Flow visualization

### **EDUCATION:**

**Ph. D. 1998** Mechanical Engineering Indian Institute of Science, Bangalore, India

**M.E. January 1992** Mechanical Engineering Indian Institute of Science, Bangalore, India

**B.E June 1990** Mechanical Engineering Bengal Engineering College Calcutta University, India

### **Thesis supervision:**

**Masters' Thesis:** 50

**Ph. D Thesis** 16 (9 completed)

### **List of Publications:**

#### **Journals:**

1. B Chandra, V Shankar, D Das (2020) Early transition, relaminarization and drag reduction in the flow of polymer solutions through microtubes **Journal of Fluid Mechanics** 885 A47, doi:10.1017/jfm.2019.1040
2. A Nayak, D Das (2019) A pseudospectral approach applicable for time integration of linearized N-S operator that removes pole singularity and physically spurious eigenmodes, **International Journal for Numerical Methods in Fluids** 91 (10), 473-486
3. Bharadwaj, K., & Das, D. (2019). Puffing in planar buoyant plumes: BiGlobal instability analysis and experiments. **Journal of Fluid Mechanics**, 863, 817-849. doi:10.1017/jfm.2018.1022

4. B Chandra, V Shankar, D Das, (2019) Onset of transition in the flow of polymer solutions through deformable tubes *Physics of Fluids* 31 (11), 114103
5. B Chandra, R Mangal, D Das, V Shankar, (2019) Instability driven by shear thinning and elasticity in the flow of concentrated polymer solutions through microtubes *Physical Review Fluids* 4 (8), 083301
6. Chandra, B., Shankar, V., & Das, D. (2018). Onset of transition in the flow of polymer solutions through microtubes. *Journal of Fluid Mechanics*, 844, 1052-1083. doi:10.1017/jfm.2018.234
7. T Murugan, CL Dora, S De, D Das, (2018) ‘A comparative three-dimensional study of impulsive flow emanating from a shock tube for shock Mach number 1.6’ *Journal of Visualization*, Vol 21(6), pp 921-934
8. Dibakar Mahalanabish\*, Debopam Das, Jonathan Neudorfer, 2018 ‘Physical Real-time Model of Diesel Particulate Filter using Second-order Perturbation Method’, *Journal of Automobile Engineering and Applications* ISSN: 2455-3360 (Online) Volume 5, Issue 3 pp-29-34
9. Kuchimanchi, Bharadwaj & Das, Debopam. (2017). Global instability analysis and experiments on buoyant plumes. *Journal of Fluid Mechanics*. 832. 97-145. 10.1017/jfm.2017.665.
10. Avinash Nayak and Debopam Das, (2017) “Transient growth of optimal perturbation in a decaying channel flow”, *Physics of Fluids* 29, 064104 <https://doi.org/10.1063/1.4985000>.
11. Debopam das, Mohit bansal & Akash manghnani, 2017, Generation and characteristics of vortex rings free of piston vortex and stopping vortex effects, *Journal of Fluid Mechanics* Vol 811 pp 138–167
12. Debopam das, Mohit bansal & Akash manghnani, 2017 *Front Cover Page* on Vortex ring, *Journal of Fluid Mechanics*. 811
13. Debopam das, Akash manghnani & Mohit bansal, 2016, Axial interaction of a vortex ring with cylinder *Journal of Fluid Mechanics* Vol 809, PP 1-30
14. Abhishek Kundu, Sudipta De, Murugan Thangadurai, C. L. Dora, Debopam Das, 2016, Numerical visualization of shock tube-generated vortex–wall interaction using a fifth-order upwind scheme, *Journal of Visualization*, Online, DOI 10.1007/s12650-016-0362-x
15. S. Pradeep Kumar, Ashoke De, Debopam Das, 2015 Investigation of flow field of clap and fling motion using immersed boundary coupled lattice Boltzmann method, *Journal of Fluids and Structures* Vol 57, Pages 247–263
16. Bharadwaj K. K., Das Debopam, Sharma P, 2015 Near field characteristics of Buoyant Helium Plume *Sadhana*, Springer Vol 40 pp757-768
17. Dora, C. L., Murugan, T., De, S., and Das, D, 2014 Mechanism of Counter Rotating Vortex Rings formation ahead of a compressible vortex ring, *Journal of Fluid Mechanics*. (2014), Vol. 753, pp. 29\_48
18. Swarandeeep Sahoo, Prafulla Sohoni and Debopam Das, 2014, Robustness of a vortex ring interacting with an axial rod, *International Journal of Structural Analysis & Design*, Vol 1, pg 28-32.
19. Swarandeeep Sahoo, Prafulla Sohoni and Debopam Das, 2014, Transition map for vortex rings over an axial rod, *International Journal of Structural Analysis & Design*, Vol 1, pg 33-37.

20. Murugan, T., De, S., Dora, C., Das, D. and Kumar, P.P. 2013, A study of the counter rotating vortex rings interacting with the primary vortex ring in shock tube generated flows **Fluid Dynamics Research Vol. 45(2)**, pp. 025506 ,2013 (**Most read article May 2013**)
21. R Neelamegam, V Shankar, and Debopam Das 2013 Suppression of purely-elastic instabilities in the torsional flow of viscoelastic fluid past a soft solid. **Physics of Fluids Vol.25**, Issue12
22. Joydeep Bhowmik, Debopam Das, Saurav Kumar Ghosh, 2013, Aerodynamic modelling of flapping flight using lifting line theory, **International Journal of Intelligent Unmanned Systems (Invited Article) Vol. 1** Iss: 1, pp.36 – 61
23. Murugan T, S. De, C. L. Dora and Debopam Das, 2012, Numerical simulation and PIV study of compressible vortex ring evolution, **Shock Waves Vol.22**, Number 1, 69-83.
24. **T. Murugan & Debopam Das**, 2012, Experimental Study on a Compressible Vortex Ring in Collision with a Wall, **Journal of Visualization Vol.15** Issue: 4 Page: 321-332
25. Ghosh, S., Dora, C., and Das, D 2012 Unsteady Wake Characteristics of a Flapping Wing through 3D TR-PIV. **J. Aerosp. Eng. 25, special section: Intelligent Unmanned Systems, pp547–558.**
26. C. Lakshmana Dora, D. Saravanan, Karunakar and Debopam Das 2011 Characteristics of embedded-shock free compressible vortex rings: A detailed study using PIV, **Advances in Mechanical Engineering .** vol. 2011, Article ID 650871, 13 pages
27. Abhijit Banerjee, Saurav K. Ghosh, and Debopam Das, 2011, Aerodynamics of Flapping Wing at Low Reynolds Numbers: Force Measurement and Flow Visualization, **ISRN Mechanical Engineering, vol. 2011, Article ID 162687, 8 pages,**
28. T. Murugan & Debopam Das, 2010, Characteristics of counter-rotating vortex rings formed ahead of a compressible vortex ring, **Expts. In Fluids Vol. 49** Issue: 6 Page: 1247-1261
29. T. Murugan & Debopam Das, 2010, Characteristics of noise produced during impingement of a compressible vortex ring on a wall, **International Journal of Aeroacoustics Vol 9** Issue 6 PP849-846
30. T Murugan & Debopam Das, 2009, On the Evolution of Counter Rotating Vortex Ring Formed Ahead of a Compressible Vortex Ring, **Journal of Visualization Vol.12 No.1 PP3-3(Jan. 2009),**
31. Sengupta T.K., Das D., Mohanamuraly P., Suman V.K. and Biswas A. 2009, Modeling Free-Stream Turbulence based on Wind Tunnel and Flight Data for Instability Studies, **Int. J. Emerging Multidisciplinary Fluid Sciences, Vol. 1, Issue:3, Pages: 181-199**
32. T Murugan & Debopam Das, 2008, On Evolution and Acoustics Characteristics of Compressible Vortex Ring, **Intl. JI of Aeroacoustics, Vol 7** PP199-222.
33. T Murugan & Debopam Das, Manish J. 2008, On the Collision of Compressible Vortex Ring with Wall, **Journal of Visualization Vol. 11** No.4 P 277-277.
34. J. H. Arakeri, D. Das, A. Krothapalli, and L. Lourenco, 2004, Vortex ring formation at the open end of a shock tube: A particle image velocimetry study, **Physics of Fluids Vol 16** Issue 4 PP1008-1019.
35. Debopam Das and Arakeri, J. H. 2001, Unsteady Laminar Duct Flow With a Given Volume Flow Rate Variation, **Jl. Applied Mech. Vol 67** pp274-281.
36. Jaywant H. Arakeri, Debopam Das, Srinivasan J. 2000, Bifurcation in a buoyant horizontal laminar jet, **Journal of Fluid Mechanics 412**, pp61-73.

37. Debopam Das, Arakeri, J. H. 1998, Transition of inflectional velocity profiles with reverse flow *Journal of Fluid Mechanics*. **374** pp251-283.
38. J. Dey, and D. Das, 1998, A note on the linear instability of the Blasius flow, *Acta Mechanica* Vol **128**, PP253-258.

#### **International Conferences: 54**

**Books:** Saha A., Das D., Srivastava R., Panigrahi P., Muralidhar K. (eds) Fluid Mechanics and Fluid Power – Contemporary Research. Lecture Notes in Mechanical Engineering. Springer, New Delhi

#### **Awards/Distinctions.**

- Received the 'Best Professor in Aerodynamics' under the Dewang Mehta National Education Awards in the sub-category: EDUCATION LEADERSHIP AWARD 2017.
- Received "Excellence in Aerospace Education Award" of The Aeronautical Society of India for the year 2015.
- Delivered Invited Talk in Asian Workshop on Theoretical and Applied Mechanics (AWTAM 2019) Hangzhou, China, August 24-27, 2019.
- Delivered invited talk in Drone Berlin-2017, 21-22 Sept 2017, in Berlin Germany
- Delivered invited talk in the 13th International Conference on Intelligent Unmanned Systems ICIUS 2017 Tamkang University Taiwan.
- Cover page article *Journal of Fluid Mechanics*, Vol. 811, 2017
- TAAI Foundation day Lecture: 27th May 2015, IISc Bangalore
- Invited talk: FMFP 13th Dec. 2012, Aerodynamics of Flapping Flight and Development of an Ornithopter.
- Official Reviewer, PRL, Physics of Fluids, JI Fluid Mechanics, JI of Heat and Fluid flow, ASME- JI Fluids Engineering and many other journals.
- Several awards won by the students on Flapping Wing work: including First prize in 'ASME SDE' -Student design competition of Kshitij-13 at IIT Kharagpur, 'International Robots got Talent' Techkriti13 for performance of a flying MAV with music.

#### **(B) Technology Products/Patents:**

##### **Patents:**

- "Ornithopter", Patent number 59/DEL/2015 J Bhowmik, and D Das
- A foldable wing design of an improved flapping wing aerial vehicle", (filed November 08, 2016) . Application number 201611038098, J Bhowmik, G Seth and D Das
- A system for particle generator in PIV applications (Patented) Application No.4I30/DEL/2015 A (published in the Official Journal No. 25/2017 of the Patent Office dated 23-06-2017.)
- ' Novel Quadrotor Convertiplane Unmanned Air Vehicle', Patent applied ,Feb. 2017, Abhishek, Krishna, R., Sinha, S., Bhowmik, J. and Das

##### **Products:**

- Development of a LED based low cost Particle Image Velocimetry (PIV) System for BARC.

- Developed a Background Oriented Schlieren (BOS) System for density measurement.
- Developed a Planar Laser Induced Fluorescence (PLIF) system for species concentration measurements.

### Projects:

Period	Sponsoring Organization	Title of Project
2019-20	ADA	Wind Tunnel Model Design, Fabrication And Testing Of A Flying Wing Configuration(Co-PI)
2019-20	OFB	Feasibility Study And Preparation Of Dpr For Smart Shell System
2019-21	ARDB	Development And Assessment Of Hybrid Rans/Les Models For Predicting Flow Physics In An Airfoil With Leading Edge Tubercles (Co-PI)
2019-20	CARITAS INFRA CON. PVT. LTD.	Wind Tunnel Model Study Of Siarang Section Of Nf Railway In Mizoram(Co-PI)
2017-20	DST	Experimental Investigations Of Instabilities In Newtonian And Viscoelastic Fluid Flow Through Deformable Tubes (Co-PI)
2017-20	DAE-BARC	Development Of Background Oriented Schlieren (Bos) Technique For Density Measurment And Visualization In Buoyant Plumers
2014-19	BOEING	Active Flow Control High Lift Study- Year 1-2 (Co-PI)
2012-14	DAE-BARC	Development of a low cost PIV system
2012-14	DAE-BARC	Experimental investigation of turbulent buoyant plume & ceiling jet behavior using time resolved PIV (TRPIV), shadowgraph and quantitative Schlieren
2011-2014	NPMICAV (DRDO)	Design, construction and aerodynamic testing of bio-mimicking flapping wing micro air vehicles and models
2014-16	IITKanpur	Design and fabrication of an autonomous flapping wing unmanned air vehicle for surveillance and aerial photography
2011-14	BOEING	High lift aerodynamics project- Phase 1-5 (Five projects)
2011-2013	ISRO	Starting flow characteristics of s200 solid motor in ground test conditions: near and far field acoustics and near field velocity measurements
2009-2011	ISRO	Development of Schlieren system to study the shock structure during starting of GSLV MK-III
2008-09 2009-10 (2 <sup>nd</sup> ph)	AFRL, AOARD, USA	Aerodynamics Characteristics Of Butterfly Flight Through Measurement Of Three-dimensional Unsteady Velocity field Using TRPIV System
2008-2010	ISRO	Measurement Of 3-D Unsteady Velocity Field Of Impinging Transient Jet
2007-2009	ISRO	Experimental Investigation Of Flow And Noise Characteristics Of Impinging Transient Supersonic Jets for Simulating Take Off of a Rocket Booster From Launch Pad
2007-2009.	AR&DB	Experimental Investigation Of Aerodynamics Characteristic Of Bird Size Flapping wings And Development Of An Ornithopter