Curriculum Vitae

Arnab Jyoti Das Gupta   **arnab.math@vidyamandira.ac.in**

Assistant Professor at the Department of Mathematics, Ramakrishna Mission Vidyamandira, Belur Math, Howrah.

▶ **PERSONAL DETAILS**

Gender : Male   **Nationality** : Indian   **Alternate Email** : arnabjdg@gmail.com

▶ **PRESENT AFFILIATION**

Assistant Professor at the Department of Mathematics, Ramakrishna Mission Vidyamandira, Belur Math, Howrah, West Bengal.

▶ **COMPUTER SKILLS**

- Proficient knowledge in C, C++ and MATLAB.

▶ **RESEARCH GUIDANCE**

- Master's thesis guidance : 3.

- (Current) PhD students : 1

▶ **TEACHING EXPERIENCE**

- Presently teaching : Measure Theory (PG sem 2), Numerical Analysis II (PG sem 4), Partial Differential Equations (UG, sem 4).

- B.Sc. (Hons, non CBCS courses) : Multivariable Calculus (sem 5, July - December 2017; August - January, 2020), Classical Algebra (sem II, March - June, 2017), Applications of Calculus (sem IV, March - June, 2017), Differential geometry (sem 6, January - June, 2018), Numerical Analysis Theory (sem 5, July - December, 2018), Numercial Analysis Practical (using C, sem 6, January - June, 2018, 2019; January - July, 2020), Real Analysis (sem 4, January - June, 2018), Real Analysis (sem 1, July - December, 2018), Computer programming and Boolean Algebra (sem 6, January - June, 2019; January - July, 2020).

- B.Sc. (Hons, CBCS courses) : Classical Algebra (sem2, CC3, January - July, 2020), Linear Algebra I (sem 2, CC4, January - July, 2020)

- B.Sc. (Gen, non CBCS courses) : Algebra (sem 1, July - December 2017), Differential Calculus (sem 2, March - June, 2017; sem 1, July - December, 2018), Probability (March - June, 2017); linear algebra (sem 4) and calculus (sem 2) for BSc Economics (Hons., Mar - Jun 2017).

- B.Sc. (Extra courses) : Remedial Classes for BSc (H) sem 1 (July - December 2017), Linear ODE (summer course for UG students, July, 2020).

- M.Sc. (Mathematics courses) : Linear Algebra I (sem I, July - December 2017), Differential Manifolds (sem III, July - December 2017, 2018), Functional Analysis (sem 4, January - June, 2018), Numercial Practical (using MATLAB, sem 2, January - June, 2018, 2019, January - July, 2020; sem 3, July - December, 2018; August - January, 2020), Real Analysis II (sem 2, January - June,2019), Ordinary Differential Equation (sem 3, July - December, 2019; August - January, 2020)

- Teaching assistant for the Inter-Disciplinary Course (instructor : Asst. Prof. Dr . P. Chiranjeevi) for the 1st year BS-MS students at IISER-Thiruvananthapuram (January-March,2017).

- Teaching assistant for the Real Analysis course (instructor: Asst. Prof. Dr. Sachindranath Jayaraman) for the 3rd year BS-MS and 1st year Integrated MS-PhD students at IISER-Thiruvananthapuram (August-November, 2016).

- Teaching assistant for the Single variable Calculus course (instructor: Assoc. Prof. Dr. Shrihari Sridharan) for the 1st year BS-MS students at IISER-Thiruvananthapuram (January - April, 2016).

- Teaching assistant for the Multivariable Calculus course (instructor: Asst. Prof. K. R. Arun) for the 2nd year BS-MS students at IISER-Thiruvananthapuram (August - November, 2015).

- Course coordinator and teaching assistant for the advanced course Partial Differential Equation (instructor: Prof. K. Sandeep of TIFR-CAM) for the 4th year BS-MS students and 2nd year Integrated MS-Ph.D. students at IISER-Thiruvananthapuram (January - April, 2015).

- Teaching assistant for a course on Ordinary Differential Equation and Dynamical System (instructor: Prof. A. S. Vasudeva Murthy), in the Instructional School for Lecturers in Differential Equations and Computations, Jaypee University, Solan, 4th-16th June, 2012.

- Teaching Assistant for an M. Sc. credit course on Functional Analysis (instructor: Dr. Venky Krishnan) in TIFR CAM (January-May, 2012).

▶ RESEARCH and EDUCATION

Jan,2015-Mar,2017	Institute Postdoctoral Fellow at the IISER-Thiruvananthapuram. Doing research on topics listed out in Present Research section.
Oct-Dec, 2014	Research Associate at Divecha Centre, CAOS, IISc. Worked on time-splitting errors in numerical integration.
Sept,2009-Sept,2014	Ph.D. scholar at TIFR CAM, Bangalore. Worked on mathematical modeling for sea-breeze under the guidance of Prof. A. S. Vasudeva Murthy.
Aug,2007-Sept,2009	M.Sc. in Mathematics with distinction and specialization in Partial Differential Equation from TIFR CAM, Bangalore. Secured 78.5 % in the aggreagate.
Jun,2004-July,2007	B.Sc. with Honours in Mathematics from Presidency College, Kolkata under the affiliation of University of Calcutta with an aggreagate of 50.5 %.
March, 2004	Qualified Indian School Certificate Examination (ISC) with 86.25 % in best of 4 subjects from The Frank Anthony Public School, Kolkata.
March, 2002	Qualified Indian Certificate of Secondary Education Examination (ICSE) with 84.6 % in best of 5 subjects from Julien Day School, Kolkata.

▶ Ph.D. THESIS

- **Thesis Title** : On some linear PDEs arising in Sea Breeze theory.

- **Advisor** : Prof. A. S. Vasudeva Murthy of TIFR-CAM, Bangalore.

- **Date of Completion** : 6th February, 2015.

▶ RESEARCH EXPERIENCE

Postdoctoral Research

1. Asymptotic Analysis for multi-scale fluid flows. (with Dr. K. R. Arun and S. Samantaray, IISER-Trivandrum) (Under review)

   - We are interested in development of numerical schemes for flow problems that involve transition from incompressible to compressible flow regime and vice-versa.

- This involves an asymptotic analysis of Godunov type schemes, which are known to admit spurious solutions for compressible flow with low mach number.

2. Investigation of time-splitting errors in numerical integration.

- I am investigating the errors that crop-up due to splitting of various numerical schemes where multiple time scales and/or high computation costs are involved. The work is under progress.

Ph.D. Research

1. Investigation of 2D models for sea breeze phenomena. (Published)

- Studied the effects of latitude (Coriolis force), background wind and coastal length on sea breeze for the tropical latitudes using linearized incompressible Euler system with Coriolis parameter. The horizontal component of the sea breeze was found to depend directly on the background wind and inversely on the latitude. Whereas, the vertical component remained unaffected by the background wind.

2. Analysis of singularities appearing in the inviscid linear theory of sea breezes. (Published)

- Singularities seem to crop up while working with the full set of linearized inviscid weather equations (linearized incompressible Euler system with Coriolis force and background wind) due to the presence of background wind. We analyzed these singularities and showed that they can be removed by taking the limits as we approach the critical points.

▶ **PUBLICATIONS and PREPRINTS**

1. **A Study of Singularities in the Inviscid Linear Theory of Sea Breezes** by A. J. Das Gupta, A. S. Vasudeva Murthy and Ravi S. Nanjundiah, *International Journal of Advances in Engineering Sciences and Applied Mathematics*, (2015) Volume 7, Issue 1, pp 33-37, DOI 10.1007/s12572-015-0129-y. Url : `http://link.springer.com/article/10.1007/s12572-015-0129-y/fulltext.html`

2. **A linear model for the sea breeze circulation relevant for the tropical regions** by A. J. Das Gupta, A. S. Vasudeva Murthy, Ravi S. Nanjundiah and C. V. Srinivas, *GEM - International Journal on Geomathematics*,(2013) Volume 4, Issue 1, pp 97-135, DOI 10.1007/s13137-013-0047-8. Url : `http://link.springer.com/article/10.1007%2Fs13137-013-0047-8#/close`

3. (Under Review) **An Implicit-Explicit Scheme Accurate at Low Mach Numbers for the Wave Equation System** by K. R. Arun, A. J. Das Gupta and Saurav Samantaray.

4. (Under preperation) **Asymptotically and uniformly stable IMEX Runge-Kutta schemes for singular wave equation system.** by K. R. Arun, A. J. Das Gupta and Saurav Samantaray.

▶ **RESEARCH INTERESTS**

I work in the area of partial differential equations. My research interests include

- partial differential equations, numerical analysis;

- investigation of PDEs (derived from NSE or Euler equations) arising in different geo-physical and physical problems on fluid flow from both numerical and theoretical point of view.

▶ **TALKS**

1. **Exploring Linear ODEs using Linear Algebra**, Departmental Students Webinar on "Recent Trends in Mathematics and Its Applications", organized by the Burdwan Raj College, June 17, 2020.

2. **An overview of stability analysis of autonomous systems arising in modified gravitational theory** at the conference in the honour of Prof. A. S. Vasudeva Murthy, organized in TIFR-CAM, Bangalore, on 30 September, 2019.

3. **Some Asymptotic Preserving IMEX schemes for wave equation with low-Mach number** at the "International Conference on Mathematics and Applications", organized By Burdwan University, 15th - 17th February, 2018.

4. **Some Asymptotic preserving schemes for wave equation with Low-Mach number** at the national conference on "Recent Developments in PDE", organized in TIFR-CAM, Bangalore, 18-19, August 2017.

5. **Asymptotically Accurate IMEX Runge-Kutta Schemes for the Wave Equation System in the Low Mach Number Limit** at the "XVI International Conference on Hyperbolic Problems: Theory, Numerics, Applications" organized in Aachen, Germany from 01-05 August, 2016.

6. **Analysis of asymptotic preserving semi-implicit schemes for the wave equation system in the low Mach number limit** at the "Conference on Computational PDE", 2015 organized in TIFR CAM, Bangalore from 21 - 23 December, 2015.

7. **On some linear PDEs arising in sea breeze theory** at the "Institut für Mathematik der Julius-Maximilians-Universität Würzburg" on 8th July, 2014.

8. **Mathematical modeling of physical processes** at the "EURO-IBSA program on sustainability with international alumni of Würzburg University" at University of Würzburg from 4th of July to 13th of July, 2014.

9. **A linear model for the sea breeze circulation relevant for the tropical regions** at the "In-House Symposium" in TIFR CAM on 12th November, 2013.

10. **Linear sea-breeze equations for the tropical regions** at the "2013 Annual Meeting of the Ramanujan Mathematical Society" at the Rewa Institute, Bangalore, India, during June 27 -30, 2013.

11. **A linear model for the sea breeze circulation relevant for the tropical regions** at the "Indo-German conference on Modeling, Simulation and Optimization in Applications", held during 5-7 September, 2012, at the Institute IWAR, TU Darmstadt, Germany.

▶ **SPECIAL COURSES AND CONFERENCES**

1. XVI International Conference on Hyperbolic Problems: Theory, Numerics, Applications organized in Aachen, Germany from 01-05 August, 2016.

2. Conference on Computational PDE at TIFR CAM, Bangalore from 21–23 December, 2015.

3. Advanced Summer School and Workshop on Control and Numerics for Fluid-Structure Interaction Problems at TIFR-CAM, Bangalore from 22nd June - 1st July, 2015.

4. Euro-IBSA-DAAD project on the issue of sustainability with international alumni of Würzburg University at University of Würzburg from 4th of July to 13th of July, 2014.

5. Compact course on Navier Stokes Equations for incompressible flows organized by Prof. Mythily Ramaswamy and Prof. G.D. Veerappa Gowda, in TIFR-CAM, from June 3 - 13, 2014.

6. Optimisation on PDE Constraints, organized in TIFR-CAM by Dr. Praveen C. and Prof. Mythily Ramaswamy, during November 25, 2013 - December 6, 2013.

7. Summer school on Numerics and Control of PDEs organized by the Indo-French Centre for Applied Mathematics (IFCAM), during July 22, 2013 - August, 02, 2013.

8. Indo-German conference on Modeling, Simulation and Optimization in Applications held during 5-7 September, 2012, at the Institute IWAR, TU Darmstadt, Germany.

9. Instructional Workshop on FEM in TIFR-CAM during 2-13 July 2012.

10. Workshop on Nonlinear Functional Analysis in the Institute of Mathematical Sciences, Chennai, India during 18-20 January, 2012.

11. International Congress of Mathematicians during August 19-August 27 2010 held in Hyderabad, India.

12. ICM satellite Conference on PDE and related topics in August 2010, TIFR-CAM, Bangalore, India.

13. Advanced Instructional School on Partial Differential Equations (AIS-PDE) during December 15, 2008-January 6, 2009, TIFR-CAM, Bangalore, India.

▶ **FELLOWSHIPS OBTAINED**

• Institute Postdoctoral fellowship from IISER-TVM, January, 2015 to March, 2017.

• Research Associate fellowship from Divecha Centre for Climate Change, CAOS, IISc from October - December, 2014.

• Research Scholar fellowship from TIFR CAM from 2009 to October, 2014.

• Qualified as JRF with rank 37 in CSIR-NET on 22nd October, 2010.

• Junior Research Scholar fellowship from TIFR CAM, 2007-2009.

• Merit scholarship from Presidency College, Kolkata, 2005-2007 (Renewed each year).