Curriculum Vitae

Shruti Dubey
Affiliation:
Department of Mathematics,
Indian Institute of Technology Madras,
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Present Position: Professor, **Department of Mathematics**, Indian Institute of Technology Madras, Chennai, India.

Academic Background:

- **Ph.D. :** Department of Mathematics and Statistics, Indian Institute of Technology Kanpur, India. www: http://www.iitk.ac.in/

  Thesis Title: ***"An investigation of some nonlinear functional differential equations and their applications".***

  - **Thesis Supervisor**: Professor D. Bahuguna

- **Master of Science** in Mathematics, 1998-2000, Indian Institute of Technology, Roorkee, India. www: http://www.iitr.ac.in/

- **Bachelor of Science** in Mathematics, Physics, Chemistry, 1995-1998 CCS University Meerut, India. www: http://ccsuniversity.org/.

Work Experience:

- **Aug 2016-July 2021 :** Associate Professor at Department of Mathematics, Indian Institute of Technology Madras, Chennai, India.
- **Sep-2010-July 2016** : Assistant Professor at Department of Mathematics, Indian Institute of Technology Madras, Chennai, India.
- **Sep 2009-Aug 2010**, Research visitor at Laboratoire d'Analyse et d'Architecture des Systèmes du CNRS (LAAS-CNRS), Toulouse, France**.**
- **Sep 2008-Aug 2009 :** Post-Doctoral Fellow at Laboratoire d'Analyse et d'Architecture des Systèmes du CNRS (LAAS-CNRS), Toulouse, France and Institut de Mathématiques de Bordeaux, France.
- **Sep 2007-July 2008 :** NBHM Post-Doctoral Fellow at Indian Institute of Information Technology, Design & Manufacturing, Jabalpur, Madhaya Pradesh, India.
- **Dec 2005-July 2007** : Lecturer at Department of Mathematics, Birla Institute of T echnology and Science, Pilani, Rajasthan, India.

Research Interest:

- Mathematical study of ferromagnetic systems
- Nonlinear analysis for functional differential equations
- Fractional differential equations
- Differential equations and Neural networks

List of Publications

Journal Publications :

1. S M Sivalingama, V Govindaraja, Shruti Dubey, An improved physics informed neural network with theory of functional connections for fractional differential equations, Engineering Analysis with Boundary Elements, Accepted.
2. Shilpa Dey, Shruti Dubey, Orthogonal polynomial-based neural network solution for differential equations with implicit boundary conditions, International Journal of Numerical Methods for Heat and Fluid Flow, https://doi.org/10.1108/HFF-11-2024-0901
3. Mishra, K.K., Dubey, S. Approximate controllability of nonlinear evolution fractional control system with delay. *Acta Math Sci* **45**, 553–568 (2025). https://doi.org/10.1007/s10473-025-0216-5
4. Mishra, K.K., Dubey, S. Solutions for non-autonomous fractional integrodifferential equations with delayed force term. The Journal of Analysis (2024). https://doi.org/10.1007/s41478-024-00837-x
5. Mishra, K.K., Dubey, S. Approximate Controllability of Nonlocal Fractional Control System. *Qual. Theory Dyn. Syst.* **23**, 232 (2024). https://doi.org/10.1007/s12346-024-01091-z
6. **Chiranjeev K Shahu, Shruti Dubey***, Transverse domain wall dynamics in hybrid piezoelectric/ferromagnetic devices. Mathematical Methods in the Applied Sciences 46 (2023) 1https://doi.org/10.1002/mma.9487.
7. **Sanjay Ku Sahoo , Vikas Gupta , Shruti Dubey***, A robust higher-order finite difference technique for a time-fractional singularly perturbed problem, Mathematics and Computers in Simulation 215 (2024) 43–68.
8. **Chiranjeev K Shahu, Sharad Dwivedi, Shruti Dubey***, Dynamics of curved domain walls in hard ferromagnets with nonlinear dissipative and inertial effects. Physica D 448 (2023) 133737.
9. **Vinodbhai, C.D., Dubey, Shruti**. Numerical solution of neutral delay differential equations using orthogonal neural network. *Scientific Reports* 13, 3164 (2023). https://doi.org/10.1038/s41598-023-30127-8
10. **Mishra, K.K., Dubey, Shruti. & Baleanu, D.** Existence and Controllability of a Class of Non-autonomous Nonlinear Evolution Fractional Integrodifferential Equations with Delay. *Qual. Theory Dyn. Syst.* 21, 165 (2022). https://doi.org/10.1007/s12346-022-00697-5
11. **Chiranjeev K. Shahu, Shruti Dubey & Sharad Dwivedi,** Domain wall motion in multiferroic nanostructures under the influence of spin-orbit torque and nonlinear dissipative effect, Mechanics of Advanced Materials and Structures, (2022) DOI:10.1080/15376494.2022.2111731
12. **Madhukant Sharma and Shruti Dubey* ,** Solvability and controllability of a retarded-type nonlocal non-autonomous fractional differential equation, Progress in Fractional Differentiation and Applications, Vol. 9(2023) Iss. 3, Article 10, http://dx.doi.org/10.18576/pfda/090310
13. **Md. Mansur Alam and Shruti Dubey***, On fractional semilinear nonlocal intial value problem with state dependent delay, Differential Equations and Dynamical Systems, https://doi.org/10.1007/s12591-022-00600-3
14. **Chavda Divyesh Vinodbhai, Shruti Dubey***, Investigation to analytic solutions of modified conformable time-space fractional mixed partial differential equations,Partial differential equations in applied mathematics, 5(2022), 100294, https://doi.org/10.1016/j.padiff.2022.100294.
15. **Chiranjeev K Shahu, Sharad Dwivedi, Shruti Dubey***, Curved domain walls in the ferromagnetic nanostructures with Rashba and nonlinear dissipative effects, Applied

Mathematics and Computation 420 (2022), 126894.
16. **Md. Mansur Alam and Shruti Dubey***, Strict Hölder regularity for fractional order abstract degenrate differential equations, *Ann. Funct. Anal.* 13, 4 (2022). https://doi.org/10.1007/s43034-021-00147-4
17. **Md. Mansur Alam and Shruti Dubey***, Mild solutions of time fractional Navier-Stokes equations driven by finite delayed forces. Progr. Fract. Differ. Appl., 8, No. 2, 253-265 (2022)
18. **Md. Mansur Alam, Shruti Dubey* and Dumitru Baleanu**, New interpolation spaces and strict Hölder regularity for fractional abstract Cauchy problem. *Bound Value Probl* **2021,** 82 (2021). https://doi.org/10.1186/s13661-021-01559-w.
19. **Kumar, A., Bhardwaj, A. and Dubey, S.** A local meshless method to approximate the time-fractional telegraph equation. *Engineering with Computers* **37,** 3473–3488 (2021). https://doi.org/10.1007/s00366-020-01006-x.
20. **Dwivedi, S., Dubey, S. & Singh, Y.P.** On the Statics of Transverse Domain Walls in Ferromagnetic Nanostrips. *Iran J Sci Technol Trans Sci* (2020) 44:717–724. https://doi.org/10.1007/s40995-020-00858-8
21. **Madhukant Sharma and Shruti Dubey,** Existence of Solutions to Sobolev type Nonlocal Nonlinear Functional Integrodifferential Equations involving Caputo derivative, Differential Equations and Dynamical Systems (2019), DOI : https://doi.org/10.1007/s12591-019-00505-8
22. **Sharad Dwivedi and Shruti Dubey,** Field-driven magnetization reversal in a three-dimensional *network of ferromagnetic ellipsoidal samples, Rendiconti del Circolo Matematico di Palermo Series 2,* (2019):DOI : https://doi.org/10.1007/s12215-019-00414-3.
23. **Sharad Dwivedi and Shruti Dubey,** On the stability of static domain wall profiles in ferromagnetic thin film*, Research in the Mathematical Sciences,* Vol. 6, No. 2(2019): DOI : https://doi.org/10.1007/s40687-018-0167-8
24. **Shruti Dubey*** and **Sharad Dwivedi,** On Controllability of a Two-Dimensional Network of Ferromagnetic Ellipsoidal Samples*, Differential Equations and Dynamical Systems,* Vol. 27, no.1-3 (2018) pp 277–297.
25. **Sharad Dwivedi** and **Shruti Dubey***, On the Stability of Steady-States of a Two-Dimensional System of Ferromagnetic Nanowires, *Journal of Applied Analysis*, 23(2): (2017): 89–100.
26. **Sharad Dwivedi and Shruti Dubey***, "On Dynamics of Current-Induced Static Wall Profiles in Ferromagnetic Nanowires Governed by the Rashba Field", International Journal of Applied and Computational Mathematics, Vol. 3,No.1 (2017) pp 27-42.
27. **Madhukant Sharma and Shruti Dubey*** , Analysis of Fractional Functional Differential Equations of Neutral type with Nonlocal conditions, Differential Equations and Dynamical Systems, Vol.25, No. 4 (2017) pp 499-517.
28. **Madhukant Sharma and Shruti Dubey*,** Controllability of Sobolev type Nonlinear Nonlocal Fractional Functional Integro-differential Equations, Progress in Fractional Differentiation and Applications, Vol.1 No 4(2015) pp. 281-293.
29. **Shruti Dubey*, Madhukant Sharma,** Solutions to Fractional Functional Differential Equations with Nonlocal Conditions, Fract. Calc. Appl. Anal.,Vol. 17, No 3(2014), pp. 654-673; DOI: 10.2478/s13540-014-0191-3.
30. **Madhukant Sharma and Shruti Dubey*,** Asymptotic Behavior of Solutions to Nonlinear Nonlocal Fractional Functional Differential Equations, J. Nonl. Evol. Equ. Appl., Vol. 2015, No.2(2015), pp 21-30.
31. **Madhukant Sharma and Shruti Dubey***, Controllability of Nonlocal Fractional Functional Differential Equations of Neutral Type in a Banach Space, Int. J. of Dynamical Systems and Differential Equations, Vol. 5 No 4(2015), pp 302-321.
32. **Shruti Agarwal, Gilles Carbou, Stephane Labbe and Christophe Prieur**, Control

of a network of magnetic ellipsoidal samples, Mathematical Control and Related Field, AIMS, 1(2011), no. 2, pp. 129-147.

33. **Shruti A. Dubey***, The method of lines applied to nonlinear nonlocal functional differential equations, Journal of Mathematical Analysis and Application, 376(2011), issue 1, pp. 275-281.
34. **Shruti A. Dubey***, Numerical solution for nonlocal sobolev-type differential equations, Electronic Journal of Differential Equations, Conf. 19 (2010), pp. 75–83.
35. **Shruti A. Dubey** *and **D. Bahuguna**, Existence and regularity of solutions to nonlocal retarded differential equations, Applied Mathematics and Computation, 215(2009), pp. 2413-2424.
36. **D. Bahuguna** and **S. Agarwal**, Approximations of solutions to neutral functional differential equations with nonlocal history conditions, Journal of Mathematical Analysis and Application 317 (2006), no. 2, 583-602.
37. **Shruti Agarwal** and **D. Bahuguna**, Existence of solutions to sobolev type partial neutral differential equations, Journal of Applied Mathematics and Stochastic Analysis (2006), 10pp, DOI 10.1155/JAMSA/2006/16308.
38. **S. Agarwal** and **D. Bahuguna**, Exact and approximate solutions of delay differential equations with nonlocal history conditions, Journal of Applied Mathematics and Stochastic Analysis 2005 (2005), no.2, 181-194.
39. **S. Agarwal** and **D. Bahuguna**, Existence and uniqueness of strong solutions to nonlinear nonlocal functional differential equations, Electronic Journal of Differential Equations 2004 (2004), no. 52, 9pp.
40. **S. Agarwal** and **D. Bahuguna,** Method of semidiscretization in time to nonlinear retarded differential equations with nonlocal history conditions, International Journal of Mathematics and Mathematical Sciences 2004 (2004), no. 37, 1943-1956.

Book Chapter:

- **S. Agarwal** and **D. Bahuguna**, Semidiscretization of nonlinear retarded differential equations, Differential Equations and Dynamical Systems. Editor: Dr. D. Bahuguna. ISBN: 81-7319-588-9. Narosa Publishing House, India, 2004, pp. 107 – 117.

Conference papers published in proceedings :

1. **Kamla Kant Mishra and Shruti Dubey,** On Space-Fractional Diffusion Equations with Conformable Derivative, Communications in Computer and Information Science, CCIS series, Springer, International digital conference on computational sciences-modelling, computing and soft computing(CSMCS-2020), Sep. 10-12, 2020.
2. **Sharad Dwivedi** and **Shruti Dubey,** On the Evolution of Transverse Domain Walls in Biaxial Magnetic Nanowires, *Materials Today: Proceedings*, 4:9 (2017): 10555-10559.
3. **Sharad Dwivedi and Shruti Dubey,** Field Driven Motion of Ferrofluids in Ferromagnetic Nanowire under the influence of Inertial Effects Procedia Engineering, Volume 127, Pages 1-1378 (2015) INTERNATIONAL CONFERENCE ON COMPUTATIONAL HEAT AND MASS TRANSFER (ICCHMT) – 2015.
4. **Sharad Dwivedi and Shruti Dubey**, On Stability of Steady-States for a Two-Dimensional Network Model of Ferromagnetic Nanowires, Analysis, Modelling, Optimization and Numerical Techniques Series: Springer Proceedings in Mathematics & Statistics, International Conference on Recent Trends in Mathematical Analysis and Its Applications (ICRTMAA), Dec. 21-23, 2014.
5. **Shruti Dubey,** Control and Stability of One Dimensional Ferromagnetic System, International Conference on Advances in Modeling, Optimization and Computing (AMOC – 2011), IIT Roorkee, Dec. 5-7 2011.
6. **Shruti Agarwal, D. Bahuguna,** A study of a class of nonlocal delay differential equations, National Conference on Mathematical Modeling and Analysis, Birla Institute of Technology and Sciences, Pilani, October 8-9, 2004.

Invited Talks / Lectures :

1. On the Cauchy Problem featuring state dependent delay and nonlocal initial conditions, 5th International Conference on Mathematical Techniques and Applications (ICMTA-2024), Department of Mathematics, SRM IST, Kattankulathur, Tamilnadu, January 2-4, 2024.
2. Solution to semilinear initial value problem with state dependent delay, International Conference on Differential Equations and Control Problems (ICDECP23), School of Mathematical and Statistical Sciences (SMSS), IIT Mandi, June 15-17, 2023.
3. Study of abstract Cauchy problem with state dependent delay, National Mathematics Day, Ramanujan Institute for Advanced Study in Mathematics, University of Madras, December 22, 2022.
4. Existence of solution for abstract fractional semilinear differential equation with delay, International Conference on Dynamical Systems, Control and their Applications, Department of Mathematics, Indian Institute of Technology Roorkee (IIT-Roorkee), July 1-3, 2022.
5. Fractional Derivatives and their importance in present scenario, Workshop on Emerging Areas in Differential Equations and Real-World Applications, Dhirubhai Ambani Institute of Information and Communication Technology (DAIICT), Gandhinagar,Gujarat, May 30, 2022 – June 3, 2022.
6. Fractional order initial value problems with state dependent delay National symposium on 'Modern Mathematical Methods in Science Engineering', NIT Warangal, May 11th, 2022
7. Solution of Time Fractional Differential Equation with delay term, International Conference on Technology, Research, and Innovation for Betterment of Society at IIIT Naya Raipur from December 17-19, 2021.
8. Study on Navier-Stokes Equations with time fractional derivative, International Conference on Recent Trends in Applied Sciences Technology and Health (RASTH), SRM Institute of Science and Technology, March 3-5, 2021.
9. Fractional Differential Equations, Faculty Development Program : Recent trens in PDEs: Theory & Computations, Department of Mathematics, NIT Andhra Pradesh, November 2-6, 2020.
10. Functional Equations, K. V. School, IIT Madras, Dec. 31, 2019 and Jan. 1, 2020.
11. Abstract Cauchy Problem for Navier-Stokes Equations with Caputo Derivative, NIT Calicut, Dec. 30, 2019.
12. Introduction to Semigroup Theory and application to PDEs, AICTE Sponsored Short term Course on Evolution Equations : Theory and Computation, IIT Madras, Chennai, August 12-17, 2019.
13. Fractional order Navier-Stokes differential equations, 84 th Annual Conference of the Indian Mathematical Society (IMS) – an International Meet, Sri Mata Vaishno Devi University, Jammu (India), November 27-30, 2018
14. Fractional differential equations, AICTE Sponsored Short term Course on Nonlinear Partial Differential Equations : Theory & Numerics, IIT Madras, Chennai, January 22-27, 2018.
15. Controllability of fractional order Sobolev type functional integro-differential equations, Advanced workshop on Hyperbolic Conservation Laws (Dec 4-7, 2017) and International conference on Nonlinear Differ ential Equations- Theory, Modeling and Computations (Dec 8-9, 2017), SRM University, Kattankulathur , Chennai.
16. Magnetization Reversal in a network of magnetic particles, 20 th International

conference of international academy of physical sciences (CONIAPS XX), University College of Science, Osmania University, Hyderabad, July 14- 16, 2017.

17. Controllability of fractional order differential equations with nonlocal initial condition, International conference on Recent advances in theoretical & computational partial differential equations and applications, Panjab University, Chandigarh, December 5-9, 2016.
18. Control of 2D ferromagnetic system governed by Landau-Lifschitz equation, International Conference on PDEs: Theory and Computation, South Asian university, New Delhi, December 28-30, 2015.
19. A study of controlability of ferromagnetic material, National Conference on Evolution Equations: Theory, Methods & Applications (NCEETMA – 2012), IIT Kanpur, December 7 – 8, 2012.

Conference/ Workshop/Seminar Presentations:

1. Solution to Fractional Navier-Stokes equations with delay term, 9th International Congress on Industrial and Applied Mathematics (ICIAM 2019), Valencia, Spain, July 15-19, 2019.
2. Control and Stability of One Dimensional Ferromagnetic System, International Conference on Advances in Modeling, Optimization and Computing (AMOC – 2011), IIT Roorkee, Dec. 5-7 2011.
3. A network of ferromagnetic ellipsoidal samples, IFAC workshop on Control of Distributed Parameter Systems, Toulouse, **France**, July 20-24, 2009.
4. Numerical solution for nonlocal sobolev-type differential equations, 8th MSU-UAB Conference on Differential Equations and Computational Simulations, Mississippi State University, **U.S.**, May 7-9, 2009.
5. A study of a class of nonlocal delay differential equations, National Conference on Mathematical Modeling and Analysis, Birla Institute of Technology and Sciences, Pilani, October 8-9, 2004.
6. Application of method of semidiscretization to nonlinear functional differential equations with nonlocal history conditions, Workshop on Wavelet Analysis and Applications, Institute of Mathematics and Applications, Bhubaneswar, Feb 7-11, 2004.

Conference/ Continuing Education Program Organization :

- Organized AICTE Sponsored Short term Course on Evolution Equations : Theory and Computation, IIT Madras, Chennai, August 12-17, 2019.

Sponsored Project :

- Mathematical Study of Anomalous Diffusion Processes via Partial Differential Equations, funded by Science and Engineering Research Board (SERB),
  Duration : 2020-2023.

- A network of ferromagnetic particles, sponsored by New faculty grant, IC and SR, IITM.
  Duration : 2011-2016.

Research Guidance :

PhD Supervision :

S. No.	Research Degree	Name of the scholar	Area of Research/Title of thesis	Current status
1	PhD	Madhukant Sharma	An Investigation of Nonlocal Fractional Order Functional Differential Equations	Completed
2	PhD	Sharad Dwivedi	Mathematical Study on Nonlinear Magnetization Dynamics in Ferromagnetic Nanostructures	Completed
3	PhD	Mansur Alam	Qualitative Study of Time Fractional Differential Equations in Banach Spaces	Completed
4	PhD	Chiranjeev	Mathematical Study on the Dynamics of Domain Wall Motion in Ferromagnetics Structures	Completed
5	PhD	Kamala Kant Mishra	Investigations on Nonautonomous Fractional Differential Equatons	Completed
6	PhD	Divyesh	Ongoing	
7	PhD	Shilpa Dey	Ongoing	
8	PhD	Rupam Kumar Das	Ongoing	
9	PhD	Samir Kar	Ongoing	

MSc Project Supervision : 5

Summer Project Supervision : 2

MSc intern supervision : 1

Teaching Experience:

Courses Taught (at IIT Madras) :

Course Title	Level
Functions of one variable	UG (Core)
Functions of several variables	UG (Core)
Numerical Methods	UG (Elective)
Differential Equations	UG (Elective)
Multivariable Calculus	PG (Core)
Linear Algebra and Numerical Analysis	UG (Elective)
Nonlinear differential equations	PG (Elective)
Modelling workshop	PG
Simulation lab	PG

Series and Matrices	UG (Core)
Partial Differential Equations	PG (Core)
Applied Integral Equations	PG (Elective)
Ordinary Differential Equations	PG (Core)

Courses Taught (at BITS Pilani) :

Course No & Title	Level	Number of Times	Remarks
MATH C192 –Mathematics-II (Linear Algebra and Complex Analysis)	UG (Core)	Twice	Instructors Incharge
MATH-C191 – Mathematics-I (Advance Calculus)	UG (Core)	Once	
MATH-C241 – Mathematics-III (Ordinary and Partial Differential Equations)	UG (Core)	Once	
AAOC-C111 – Probability and Statistics	UG (Core)	Twice	

Courses Taught (at IIT Kanpur) (during Ph.D**) :**

Course No & Title	Level	Number of Times	Remarks
MTH-203 – Mathematics-III	UG (Core)	Once	Tutor

- Teaching Assistant in various courses taught in the Department of Mathematics IIT Kanpur.

Computer Skills:

- Operating Systems: Linux, MS Windows
- Programming Languages: Matlab, C/C++.
- Software Packages: Xfig, Latex, GNU-GSL, MS - Office etc.

Prizes/Awards/Honours

- Guest Editor *Computational and Mathematical Biophysic (2023)*
- Guest Editor *Differ Equ Dyn Syst* 29**,** 1 (2021). https://doi.org/10.1007/s12591-021-00561-z
- Elected member of National Academy of Sciences India (NASI) awarded by NASI in 2019.
- Life member of Indian mathematical society (IMS) since 2019.
- Best Paper Award for their paper entitled 'Field-driven Motion of Ferrofluids in Ferro-magnetic Nanowire under the Influence of Inertial Effect' at the International Confer-ence on Computational Heat and Mass Transfer (ICCHMT-2015) held in Warangal.
- Received NBHM post-doctoral fellowship in 2006.
- Qualified Graduate Aptitude Test in Engineering (GATE), March 2001.
- Recipient of IIT, Roorkee Merit Scholarship (1998-2000)

- Merit scholarship since 6th grade to B. Sc.

Service Role :

- Board of studies member, NIT Andhra (July 2024 – continue)
- Disciplinary and Welfare committee member of IITM BS Date Science program (2021-June 2024)
- Sports Co-advisor IIT Madras (April 2023- continue)
- Expert member of Board of Faculty of Sciences, Chandigarh University (2023- continue)
- Board of Academic committee member (August 2023-continue)
- Workload committee member (2022-2023)
- Warden (Sabarmati Hostel) (2019-2023): managed and handled a challenging situation of Covid during lockdown when girls were staying back to the campus and am continuing with my responsibilities.
- Chairperson of Prof. Malathi Veeraraghvan-Institute day award 2021 committee.
- OHM purchase committee member (2020- 2023).
- Mess monitoring and control committee (MMCC) member (Aug 2019-Jan 2023).
- Institute Time-Table committee member(July2017-Dec2019)
- Department workload in-charge (July2017-Dec2019)
- MSc curriculum revision committee member (2018-19)
- Serving as examiner of PhD thesis submitted in IITs, NITs and other reputed institutions.
- Institute Official language implementation committee (OLIC) member (2016-17): represented department of Mathematics and took care of implementation of the MHRD orders.
- DC member of internal and external committees.
- MSc/MTech faculty advisor.
- Institute Representative for GATE and JEE.