



## Shweta Kumari

PhD Scholar  
Department of Mathematics  
IIT Delhi

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Google Scholar Profile  
ResearchGate Profile

### RESEARCH INTERESTS

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Finite Difference Schemes, Fractional Differential Equations, Loaded Differential Equations, and Metric Graphs.

### EDUCATION

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- **PhD** *September 2020-to date*  
  
*Title of Thesis(proposed): Standard and Nonstandard Finite Difference Schemes for solving Time-Fractional Loaded Differential Equations on Metric Graphs*  
*Supervisor: Prof. Mani Mehra*  
*Department of Mathematics, IIT Delhi*
- **MSc Mathematics and Computing** *July 2017-June 2019*  
  
**CGPA:** 9.15  
*Dissertation Topic: Analytical Study of Water Wave Scattering by Dual Porous Walls at a Step-Type Sea Bottom*  
*Supervisor: Prof. Ramanababu Kaligatla*  
*Department of Mathematics, IIT-ISM Dhanbad*
- **BSc Mathematics (Hons.)** *July 2014-June 2017*  
  
**Percentage:** 89%  
*S.S.L.N.T. Mahila College, Dhanbad*  
*Vinoba Bhave University, Hazaribagh*

### ACADEMIC POSITIONS

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- **Senior CSIR Research Fellow** at IIT Delhi October 2022-to date.
- **Junior CSIR Research Fellow** at IIT Delhi September 2020 to September 2022.

### TEACHING ASSISTANT-SHIP

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- **MTL712: Computational Methods for Differential Equations** Sem. I, 2021-22, 2023-24  
  
In this course, I took two tutorial (LAB) classes weekly and evaluated the answer scripts.
- **MTL101: Linear Algebra and Differential Equations** Sem. II, 2021-22  
  
In this course, I took one tutorial class weekly and evaluated the answer scripts.
- **MTL505: Computer Programming** Sem. I, 2022-23, 2024-25  
  
In this course, I took two tutorial (LAB) classes weekly and evaluated the answer scripts.
- **MTL509: Numerical Analysis** Sem. II, 2022-23  
  
In this course, I took one tutorial class weekly and evaluated the answer scripts.

- **MTP290: Computing Laboratory**

Sem. II, 2023-24

In this course, I took one tutorial (LAB) class weekly and evaluated the answer scripts.

- **MTL107: Numerical Methods and Computations**

Sem. II, 2024-25

In this course, I took some tutorial classes and evaluated the answer scripts.

## ACHIEVEMENTS

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- **Qualified CSIR-JRF** with an AIR 136, *conducted by UGC-CSIR in December 2019.*
- **Qualified GATE (MA)-2019** *conducted jointly by IITs and IISc.*
- **Secured Merit-cum-Means (MCM)** scholarship in M.Sc., *granted by IIT-ISM Dhanbad for sessions 2017-18 and 2018-19.*
- **Qualified IIT JAM (MA)-2017** *conducted jointly by IITs and IISc.*

## CONFERENCES AND WORKSHOPS

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- Going to present a paper titled “**Fourier Error Analysis of Caputo Derivative Approximations based on Lagrange Interpolation over Uniform Mesh**” at *25th International Conference on Computational Science, 7-9 July 2025, Singapore.*
- Presented a paper titled “**Numerical Approximation of Spatially Loaded Time-Fractional Diffusion Equation**” at *2024 IFAC International Conference on Fractional Differentiation and its Applications, July 9-12, 2024, Bordeaux, France.*
- Presented a paper titled “**Analysis and simulation of diffusion equation on star graph with/without temporal loads**” at *5th International Conference on Mathematical Techniques and Applications (ICMTA-2024), Jan 04-06 2024, SRM University, Chennai.*
- Attended “*Workshop on Scientific Computing, Modeling and Deep Learning (WSCMDL)*” organised in SRM University, Chennai, Jan 02-04 2024.
- Presented a paper titled “**L1 type approximation of a temporally loaded time-fractional diffusion equation**” in the online mode at *The International Conference on Fractional Differentiation and its Applications (ICFDA 2023) Ajman University, UAE, 14-16 March 2023.*
- Attended AIS - “*Fractional Differential Equations: Theory and Computations (2022)*” organised in South Asian University, New Delhi from 12-24 Dec 2022.

## PUBLICATIONS

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### Refereed Journals

#### Accepted/Published

- J1. “Numerical solution to loaded difference scheme for time-fractional diffusion equation with temporal loads”. Shweta Kumari, Mani Mehra, Journal of Mathematical Chemistry 2025.
- J2. “High-order approximation to Caputo derivative on graded mesh and time-fractional diffusion equation for nonsmooth solutions”. Shweta Kumari, Abhishek Kumar Singh, Vaibhav Mehendiratta, and Mani Mehra, Journal of Computational and Nonlinear Dynamics 2024.

#### Communicated

- J3. “A study on spatially loaded time-fractional diffusion equation: Well-posedness, discretization, and simulation”. Shweta Kumari, Mani Mehra, communicated to Numerical Methods for Partial Differential Equations.

- J4. “Finite difference approximation of time-fractional advection-diffusion equation on a metric star graph”. Shweta Kumari, Mani Mehra, Vaibhav Mehandiratta, communicated to International Journal of Computer Mathematics.
- J5. “Analysis and simulation of diffusion equation on star graph with/without temporal loads”. Shweta Kumari, Mani Mehra, communicated to Applicable Analysis.
- J6. “A nonstandard finite difference explicit scheme for two-dimensional Caputo-type time-fractional diffusion with improved stability”. Shweta Kumari, Mani Mehra, to be communicated.

## Refereed Conference Proceedings

### Accepted/Published

- C1. “Fourier Error Analysis of Caputo Derivative Approximations based on Lagrange Interpolation over Uniform Mesh”, Shweta Kumari and Mani Mehra. Accepted in the 25th International Conference on Computational Science, 7-9 July 2025, Singapore, and to be published in the proceedings: ICCS 2025, Part V, LNCS 15911.
- C2. “Numerical Approximation of Spatially Loaded Time-Fractional Diffusion Equation”. Shweta Kumari and Mani Mehra. In: the proceedings of 12th IFAC Conference on Fractional Differentiation and its Applications, ICFDA 2024, pages 89-94, 2024.
- C3. “L1 type approximation of a temporally loaded time-fractional diffusion equation”. Shweta Kumari and Mani Mehra, 2023 International Conference on Fractional Differentiation and Its Applications (ICFDA), Ajman, United Arab Emirates, 2023, pages 1-6, 2023.

## RESPONSIBILITIES

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- **Class Representative** for M.Sc. (Mathematics), IIT ISM Dhanbad from August 2017 to June 2019.
- **Class Representative** for B.Sc. Hons. (Mathematics), S.S.L.N.T. Mahila College, Dhanbad, from August 2014 to June 2015.