Dr. POONAM YADAV

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Profile:

- Ph.D. awarded on the topic "Numerical Techniques for Fractional and Variable Order Mathematical Models" by the Department of Mathematical Sciences at Indian Institute of Technology (BHU), Varanasi.
- Currently, working as a Assistant Professor (Guest Faculty) at Indian Institute of Information Technology, Bhagalpur Bihar.
- Worked as a Temporary Faculty at National Institute of Technology, Raipur, Chhattisgarh from 5 September, 2024 to 31 June 2025.
- Have hands-on practice in C and MATLAB.
- Good Understanding of Differential and Integral equations, Applied Mathematics.
- Qualified for the National level exam Graduate Aptitude Test in Engineering (**GATE**) conducted by MHRD in 2018 and 2019.

Academic Qualification:

Qualification	Name of Degree	Institute/University	Year of Completion
Doctorate of Philosophy	Ph.D. Mathematics	Indian Institute of Technology (BHU) Varanasi, India	2023
Post Graduation	M.Sc. Mathematics	Udai Pratap Autonomous College, Varanasi.	2015
Graduation	B.Sc. Mathematics	Udai Pratap Autonomous College, Varanasi.	2013
Intermediate	Science (Math)	Rani Murar Kumari Balika Inter College, Varanasi	2010
High school	Science (Math)	Rani Murar Kumari Balika Inter College, Varanasi	2008

Work Experience

- Worked as a Temporary Faculty at **National Institute of Technology, Raipur,** Chhattisgarh from 5 September, 2024 to 31 June 2025.

Awards and Fellowships

1. **Senior Research Fellow** at IIT (BHU) Varanasi (Jan 2021-Dec 2023).
2. Qualified Graduate Aptitude Test in Engineering (**GATE**) conducted by MHRD in 2018.
3. Qualified in the Graduate Aptitude Test in Engineering (**GATE**) conducted by MHRD in 2019.

Teaching at UG (B.Tech.) Level:

- MA 201 (Numerical Techniques)
- MA 101 (Calculus and Laplace Transform)
- MA 102 (Mathematics II Analysis and Algebra)
- Mathematics-I (Differential Calculus, Integral Calculus)
- Mathematics-II (Linear algebra, Differential Equations, Vector Calculus)
- Mathematics-IV (Computational Mathematics)

Teaching interest at UG and PG level:

Numerical Technique, Linear Algebra, Complex Analysis, and Mathematical Analysis.

Academic visit:

- Indian Institute of Science Bengaluru, India.
- Indian Institute of Technology Mandi, India.

Skills:

- Typing Software – MS Office, Latex.
- Programming Languages- MATLAB, C Programming

Objective

To explore the world of mathematics and devoted to hard work for innovation of higher education and research in the field of constant order and variable-order fractional mathematical models and their applications in solving various scientific problems. I am also seeking challenging research and academics, where my knowledge, skills, and experience can be utilized for sustainable growth.

Research Direction

My major area of research focuses on **"Constant order and variable-order mathematical models"**. Currently, I am developing some numerical schemes to solve fractional-order partial differential equations. The title of my thesis is "**Numerical Techniques for Fractional and Variable Order Mathematical Models"** under the supervision of Dr. Vineet Kumar Singh at the Department of Mathematical Sciences, Indian Institute of Technology (BHU) Varanasi, India, and Co-Supervision of Anatoly A. Alikhanov at Department of Computational Mathematics and Cybernetics, North-Caucasus Federal University, Stavropol, Russia.

Ph.D. Thesis: Numerical Techniques for Fractional and Variable Order Mathematical Models

Abstract: In this thesis, we aim to explore the construction and analysis of novel techniques to solve fractional-order partial differential equations. Many relevant physical models in science and engineering can be modeled more accurately by fractional order than integer order derivatives. For example, anomalous diffusion model, groundwater problems, etc. The constant order fractional calculus (COFC) formalism is capable of addressing some very important physical phenomena. For example, to characterize the anomalous diffusion model, it can not capture an important class of physical phenomena, where the order is a function of independent variables. For instance, the reaction kinetics of proteins have been found to exhibit relaxation mechanisms that are properly described by a temperature-dependent fractional order. Another example is the diffusion process in a porous medium where the medium structure or external field changes with time. The study investigates the application of Legendre wavelets and the Interpolating scaling function and also constructs the novel discrete version of the variable order Caputo-derivative.

Research Papers

- ## Published in SCI/SCIE Journals

1. **Poonam Yadav,** B. P. Singh, Anatoly A. Alikhanov, Vineet Kumar Singh, Numerical Scheme with Convergence Analysis and Error Estimate for Variable Order Weakly Singular Integro- Differential Equation, **International Journal of Computational Methods**, 20(2023), 2250046-39(1-39).
2. Yashveer Kumar, **Poonam Yadav**, Vineet Kumar Singh, Distributed Order Gauss Quadrature Scheme for Distributed Order Fractional SubDiffusion Model, **Chaos, Solitons and Fractals**, 170 (2023), 113358.
3. **Poonam Yadav**, Aman Singh., Vineet Kumar Singh, Stable Computational Techniques for the Advection –Dispersion Variable Order Model, **International Journal of Computational Methods**, 20, (2023), 10,2350012.
4. Aman Singh, EB Postnikov, **Poonam Yadav**, Vineet Kumar Singh, Weakly Singular Volterra Integral Equation with Combined Logarithmic-Power-Law Kernel: Analytical and Computational Consideration, **Applied Numerical Mathematics**, 197,(2024), 164-185 .
5. Sunil Kumar, **Poonam Yadav**, Vineet Kumar Singh, Product Integration Techniques for Fractional Integro-Differential Equations, **Mathematical Methods in Applied Sciences**, 44 (2025) 2833-2858, https://doi.org/10.1002/mma.10464.
6. Anatoly A. Alikhanov**, Poonam Yadav,** Vineet Kumar Singh, Mohammad Shahbazi Asi, A High-Order Compact Difference Scheme for the Multi- Term Time Fractional Sobolev Type Convection-Diffusion Equation, **Computational and Applied Mathematics**, 44, (2025) 115, https://doi.org/10.1007/s40314-024-03077-8.

- ## Submitted in SCI/SCIE Journal

1. **Poonam Yadav**, Sunil Kumar, Vineet Kumar Singh, A High-Order Computational Scheme for Variable Order Time Fractional Diffusion Equation, **International Journal of Computer Mathematics** (Communicated).

Workshops/ Conferences/Webinars (National/International):

1. Participated and presented a paper at the **International Conference** on "**Differential Equations and Control Problems (ICDECP23)"** organized by the School of Mathematical & Statistical Sciences, **IIT Mandi, H. P. India,** during June 15-17, 2023.
2. Participated and presented a paper at **"Indo-German Conference on Computational Mathematics"** conducted by the Department of Computational and Data Sciences**, Indian Institute of Sciences Bangalore, India,** during March 27-30, 2023.
3. Participated and presented a paper at the **International Conference** on **"Fractional Calculus: Theory, Application & Numerics (ICFCTAN)"** conducted by the **National Institute of Technology Puducherry, Karaikal,** during January 27-29, 2023.
4. Participate in "**International Workshop on Numerical Analysis of Ordinary and Fractional Partial Differential Equations**" organized by the Faculty of Mathematics, **Govt. Tilak PG College, Katni, MP, India** on December27-31,2022.
5. Attend a three-day "**Python Workshop**" conducted by **MACS** during September 21-23,2022.
6. Participated in the Ministry of Education supported Lecture session on "**Accelerators/ Incubation-Opportunities for Students & Faculties-Early Stage Entrepreneurs**" organized by the **IIC Cell, NIT Andhra Pradesh, Tadepalligudem** on July 27, 2022.
7. Participated in the **International Workshop** on "**Fractional and Computational Intelligence**" organized by the Department of Mathematics, **Govt. MGM PG College, Itarsi (MP), India**, during January 06-07, 2022.
8. Participated in "**International Workshop on Fractional derivatives: Theory & Computations with Applications (FDTCA 2021)**", organized by the Department of Mathematical Sciences**, Indian Institute of Technology (BHU), Varanasi, India**, November 12-14, 2021.
9. Participated in the **International Workshop on Numerical and Analytical Techniques in Engineering Problems** organized by the Department of mathematics, **SRM Institute of Science and Technology, Kattankulathur, Tamil Nadu, India**, from November 12-13, 2020.
10. Attend a two-day workshop on "**MATLAB: Basic Concepts**" conducted by IEEE Student Branch IIT (BHU), Varanasi during April 13-14, 2019.