Manoj Solanki | M.Sc. Mathematics

National Institute of Technology Kurukshetra (India)

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🌐 Portfolio website   **in** LinkedIn Profile   ▶ YouTube Channel   ⭘ GitHub

Area(s) of Interest

Numerical Analysis, Applied Numerical Analysis, and Computational Numerical Analysis with a focus on solving linear and non-linear models of differential equations using the Compact Finite Difference Method (CFDM), Finite Difference Method (FDM), and Finite Element Method (FEM), specifically implemented in Python.

Education

Program	Institution/Board	Year(s)
Master of Science (Mathematics)	National Institute of Technology Kurukshetra *Kurukshetra, Haryana*	Aug 2023 - June 2025
Bachelor of Science (Mathematics,Physics,Chemistry)	Lachoo Memorial S & T College *Jodhpur, Rajasthan*	July 2020 - June 2023
Higher Secondary (Mathematics,Physics,Chemistry)	Rajasthan Board of School Education *Jodhpur, Rajasthan*	April 2018 - March 2020

Master's Project

Compact Finite Difference Method to solve Differential Equations 🔗	**Dec 2024 - 2025**
(Supervisor: Dr. Harshita Madduri) 👤	*NIT Kurukshetra*

○ Higher Order Compact Finite Difference Scheme for Solution of Advection-Diffusion-Reaction Equations.

○ Language(using): Python   ○ Tools(using): Anaconda(Spyder),GPU,and Matheamtica

Research Projects

1. NeuroNumerics: A Comparative Study of PDE Solvers ⭘   **July 2025 - On-going**
(Collaborator: Mamta Saini - SciML Er. at ZenteiQ)   *IISC Banglore*

○ This project presents a comparative study between traditional high-order numerical schemes and Physics-Informed Implicit Neural Networks (PIINs) for solving partial differential equations (PDEs). We implement both approaches for elliptic, parabolic, and hyperbolic equations and evaluate them on accuracy, efficiency, and stability.

2. Comparison of Solution of Linear and Solution of Non Linear Parabolic PDEs 🔗 **June 2024 - Dec 2024**
(Supervisor: Dr. Harshita Madduri) 👤   *NIT Kurukshetra*

○ Implemented the heat Equation model by Explicit, Implicit and Crank Nicolson and compared for computational cost with Thomas Algorithm for Tri-Diagonal SOLE and Sparse Matrix. Using Python and using Newton's and Quassi Linearization method and FDM solved the various Types of Differential Equation including Burgers equation etc.

Course Projects

Package of Numerical Methods in Python 🔗	**Jan 2024 - May 2024**
(M.Sc. / Faculty: Dr. R.P. Singh 👤 and Dr. Harshita Madduri 👤)	*NIT Kurukshetra*
Python Implimentation of All numerical Methods 🔗 🔗	**Jan 2024 - May 2024**
(M.Sc. / Faculty: A.S.V Ravi Kanth) 👤	*NIT Kurukshetra*

Courses

NPTEL (2024-2025)

○ *Data Analytics with Python* By IIT Roorkee ✺   ○ *Dynamical System and Control* By IIT Roorkee ✺

○ *Applied Numerical Methods* By IIT Kanpur ✺   ○ *Number Theory* By IIT Bombay ✺

ISRO and IIRS

○ *Artificial Intelligence and Machine learning* Geo-Data Analysis in Online Mode **(2024)** ✺

NIT Kurukshetra

- *Machine learning* ML Techniques and Applications in Online Mode **(2023)** ❉

Technical Skills

- Programming Language: C, Python   ○ Web Technology: HTML
- Tools: LATEX, MATLAB, MTHEMATICA, Anaconda, Microsoft Office, VSDC (for Video Editing), Photoshop

Publications

- *Numerical Solutions of Differential Equations with Programs in Python* ISBN - 978-93-341-9831-7 **(2025)**
- *General Maths Book - for Secondary School Level* ASIN - B0B85N2VZS **(2021)**

Teaching and Experiences

- Working as Assistant Professor of Mathematics at ***Dayananda Sagar University, Bangalore***
- Worked in management team for workshop titled *A Five Day Workshop on Recent Advances in Scientific Computing (RASC-2025)*,conducted by **Mathematics Department, NIT Kurukshetra (India)(May-2025)**.
- *Educator for Higher Mathematics* at MS MATHS YouTube Channel **(2020 - Ongoing)**.
- *Math Teacher* at Vyas Institute **(April 2022 - March 2023)**.
- *Math and Physics Teacher* at HAVM Hostel **(April 2021 - May 2022)**.

Workshops and Lectures

- Attended workshop titled *A Five Day Workshop on Recent Advances in Scientific Computing (RASC-2025)*,conducted by **Mathematics Department, NIT Kurukshetra (India)(May-2025)**.
- Attended a lecture titled *Two Days Workshop on Latex for Technical Writing*,conducted by **School of Computational and Integrative Sciences, Jawaharlal Nehru University, New Delhi(April 2025)**.
- Attended a lecture titled *Sigma Sessions* by Dr. Rao (TCS), conducted by **Anant The Mathematical Society, NIT Kurukshetra (April 2025)**.
- Attended a lecture titled *Diffusion Driven Instability - Non-Linear PDE* by Dr. Ch. Srinivasa Rao (IIT Madras), conducted by **Anant The Mathematical Society, NIT Kurukshetra (March 2025)**.
- Attended a lecture titled *Vedic Mathematics - Vedic Intelligence* by Dr. Rakesh Bhatia, conducted by **Anant The Mathematical Society, NIT Kurukshetra (Feb 2025)**.
- Participated in a Five-Day Workshop on *Differential Equations and Its Numerical Solutions*, conducted by **IIT Roorkee (Feb 2025)**.
- Participated in a Three-Day Workshop on *Harmonic Mappings, Partial Differential Equations, and Applications (HMPDEA 2025)*, conducted by **IIT Bhilai (Jan 2025)**.

Presentations

- **Title:** *Compact finite difference schemes for partial differential equations* for Thesis defense of Masters research project. **NIT Kurukshetra (July 2025)**.
- **Title:** *Post Script in Latex* for M.Sc. Course Work in Advanced Computing language, **NIT Kurukshetra (April 2025)**.
- **Title:** *Solution of Black-Scholes PDE using CFDM* for M.Sc. Course Preparatory Project Work, **NIT Kurukshetra (Feb 2025)**.
- **Title:** *Applications of Python in Mathematics (APM-2025)* presented to M.Sc. and B.Tech. students, conducted by Anant The Mathematical Society, **NIT Kurukshetra (Dec 2024 - Feb 2025)**.
- **Title:** *Introduction to LaTeX* presented to M.Sc. 1st Year students, conducted by Anant The Mathematical Society, **NIT Kurukshetra (Nov 2024)**.

Positions of Responsibility

- *Board Member* of Selection Committee of New Office Bearer of Anant, NIT Kurukshetra **April 2025)**.
- *Office Bearer* of Anant The Mathematical Society, NIT Kurukshetra **(May 2024 - May 2025)**.
- *Co-Convener of Techspardha'25*, Annual Tech Fest of NIT Kurukshetra **(March 2025)**.
- *Event Coordinator*, Annual Fest of AVM School **(Feb 2023)**.

Achievements/Awards

- Offered Assistant Professor position in Mathematics at Dayananda Sagar University, Bangalore, through campus placement from NIT Kurukshetra.

- Published an article titled *"ODE in LIVE Science"* in **HELIOS: Institute Magazine 2024-25**, National Institute of Technology (NIT) Kurukshetra
- Qualified *IIT JAM* (2023) M.Sc. Entrance examination in mathematics
- Qualified *CUET PG* (2023) Common University Entrance Test for Postgraduate Programs examination in mathematics
- Secured **AIR 11** in *MSc Entrance Test* conducted by South Asian University Delhi (2023).
- Awarded as *Co-Convener of Techspardha'25* for contribution as in Tech Fest by Techspardha Team (2025).

Others

- Hobbies: Teaching, Traveling, Music, Reading
- Languages: English, Hindi, Marwari.

References

1. **Prof.(Dr.) A.S.V Ravi Kanth** 👤
   Designation: Head of Department and Professor, Mathematics Department NIT Kurukshetra
   Contact Info: asvravikanth@nitkkr.ac.in

2. **Dr. Harshita Madduri** 👤
   Designation: Assistant Professor, Mathematics Department NIT Kurukshetra
   Contact Info: mmharshita@nitkkr.ac.in

Declaration: *I do hereby declare that all the details furnished above are true to the best of my knowledge and belief.*

Place: Jodhpur, Rajasthan (India)   Manoj Solanki

Date: 26th July,2025

Note: Highlighted are link to proofs and validation (if required).