Sumit Mahajan, Research Associate

Department of Mathematics
IIT Roorkee
Supervisor: Dr. Arbaz Khan and Dr. Manil T. Mohan

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Area(s) of interest

Numerical Solution of Partial Differential equations (PDEs), Finite Element method (FEM), DGFEM , Control problems, Adaptive FEM.

Education

April 2025- Ongoing	**Post-Doctoral Researcher, Team RAPSODI, Center Inria University De Lille.** **Supervisors:** *Dr. Théophile Chaumont-Frelet (Inria Lille) and Dr. Martin Vohralík (Inria Paris)*
November 2024- February 2025	**Research Associate, IIT Roorkee.** **Supervisors:** *Dr. Arbaz Khan and Dr. Manil T. Mohan*

Education

November 2024- Ongoing	**Research Associate, IIT Roorkee.** **Supervisor:** *Dr. Arbaz Khan and Dr. Manil T. Mohan*
February 2021 - November 2024	**Ph.D., IIT Roorkee.** **Thesis title:** *Theoretical and Numerical Studies of the Generalized Burgers-Huxley Equation with Weakly Singular Kernels* **Supervisor:** *Dr. Arbaz Khan*
July 2018 - September 2020	**M.Sc. Mathematics, IIT Roorkee.**
July 2015 - June 2018	**B.Sc. (H.S.) Mathematics, Panjab University, Chandigarh.**
April 2013 - March 2015	**Higher Secondary Education, Science (Mathematics, Physics, Chemistry), Swami Sant Dass Public School, Jalandhar.**

Master's Project

Jan 2020— July 2020	**Thesis Title**: Generalised Burgers'-Huxley equation with memory in one dimension. **Supervisor:** Dr. Manil T. Mohan, Associate Professor, IIT Roorkee.
July 2019— Nov 2019	**Seminar Title**: Nonlinear differential equations: Local theory. **Supervisor:** Dr. Manil T. Mohan, Associate Professor, IIT Roorkee.

Research Articles

- **Journal papers**

  1. **S. Mahajan, A. Khan, and M. T. Mohan**. Finite element approximation for a delayed generalized Burgers-Huxley equation with weakly singular kernels: Part I Well-posedness, Regularity and Conforming approximation,
  Computers and Mathematics with Applications, 174, 261–286, 2024.
  https://doi.org/10.1016/j.camwa.2024.08.036.

2. **S. Mahajan and A. Khan**. Finite element approximation for a delayed generalized Burgers-Huxley equation with weakly singular kernels: Part II Nonconforming and DG approximation,
   SIAM Journal on Scientific Computing, *46(5), A2972–A2998, 2024.*
   https://doi.org/10.1137/23M1612196.

- **Journal papers under review**

  1. **S. Mahajan and A. Khan**. A posteriori error estimates for the generalized Burgers-Huxley equation with weakly singular kernels.
     arXiv preprint *arXiv:2403.08269.*

  2. **S. Mahajan and A. Khan**. hp-Discontinuous Galerkin method for the generalized Burgers-Huxley equation with weakly singular kernels.
     arXiv preprint arXiv:2409.00818.

Teaching Experiences

Sept 2023− Ongoing	**K.L. Polytechnic College** Guest Lecturer.
July 2024− Ongoing	**IIT, Roorkee** Teaching Assistant (T.A.) for MAB-103 , Numerical Methods, B.Tech Second Year.
Jan 2024− May 2024	**IIT, Roorkee** Teaching Assistant (T.A.) for MAI-102 , Mathematics-II, B.Tech First Year.
May 2022− July 2023	**Roorkee College of Engineering (RCE)** Guest Lecturer.
Jan 2023− May 2023	**IIT, Roorkee** Teaching Assistant (T.A.) for MAN 006, Probability and Statistics, B.Tech First Year.
July 2022− Dec 2022	**IIT, Roorkee** Teaching Assistant (T.A.) for MAN 001, Mathematics-I, B.Tech First Year.
Jan 2022− May 2022	**IIT, Roorkee** Teaching Assistant (T.A.) for MAN 006, Probability and Statistics, B.Tech First Year.

Conference Presentations

Feb 21 − 24, 2024	**Talk title:** A posteriori error estimates for the generalized Burgers-Huxley equation with weakly singular kernels. **Conference:** Latest Advances in Computational and Applied Mathematics-2024 (LACAM-24) organized by IISER Thiruvananthapuram, Kerala, India.
Aug 20 − 25, 2023	**Talk title:** An hp-version discontinuous Galerkin method for the generalized Burgers'-Huxley equation with weakly singular kernels. **Conference:** 10th International Congress on Industrial and Applied Mathematics (ICIAM 2023) organized by the Waseda University, Tokyo, Japan.
Aug 14 − 18, 2023	**Talk title:** A posteriori error estimates for the generalized Burgers-Huxley equation. **Conference:** International Conference on Spectral and High Order Methods 2023 (ICOSAHOM 2023) organized by the Yonsei University, Seoul, Korea.
Sept 15 − 17, 2022	**Talk title:** Finite element method for the generalized Burgers-Huxley equation with memory. **Conference:** Chemnitz Finite Element Symposium 2022 organized by the Universität der Bundeswher Müchen, Germany.
July 1 − 3, 2022	**Talk title:** Finite element method for the generalized Burgers-Huxley equation with memory **Conference:** International Conference on Dynamical Systems, Control and their Applications (ICDSCA-22) organized by the Department of Mathematics, IIT Roorkee.

Miscellaneous Experience

Acadmic Awards

2021	🔖	Awarded the prestigious **Prime Minister's Research Fellowship** for December 2021 cycle 8.
2020	🔖	Qualified **GATE (Mathematical Sciences)** with AIR-104 and eligibility of lectureship held in February.
2019	🔖	Qualified **CSIR Net Exam (JRF)** in Mathematics with AIR-34 and eligibility of lectureship held in June.

Position of Responsibilities

Nov 2021− 2023	🔖	Department Research Committee (DRC) Student representative at the Department of Mathematics, IIT Roorkee.
March 7, 2022	🔖	Co-Convener of the Research Scholar Day 2022 held in the Department of Mathematics, IIT Roorkee.
Jan 17, 2020	🔖	Coordinator of the Research Scholar Day held in Department of Mathematics, IIT Roorkee.
April 2019 − 2020	🔖	Vice president of Mathematical Colloquium in Department of Mathematics, IIT Roorkee.

Skills

Languages	🔖	Strong reading, writing and speaking competencies for English, Hindi, Punjabi.
Coding	🔖	Elementary knowledge of C, C++, Python.
Tools	🔖	Matlab, FEniCS, LaTeX.

Declaration

I hereby declare that the information furnished above is true and correct to the best of my knowledge and belief.

References

1. **Dr. Arbaz Khan**
   Designation: Assistant Professor, Department of Mathematics, Indian Institute of Technology, Roorkee
   Contact Information: arbaz@ma.iitr.ac.in

2. **Dr. Manil T. Mohan**
   Designation: Associate Professor, Department of Mathematics, Indian Institute of Technology, Roorkee
   Contact Information: maniltmohan@ma.iitr.ac.in