Aekta Aggarwal

Personal Data

Date of Birth: 10.08.1985

Affiliation: Operations Management and Quantitative Techniques, Indian Institute of Management, Indore

Specialization: Applied Mathematics, Differential Equations

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Education

2006–2014 **Integrated M.Sc–Ph.D. in Mathematics**, *Centre for Applicable Mathematics,TIFR*, Bangalore.

2003–2006 **B.A. (Honours) Mathematics**, *Lady Shri Ram College for Women*, University of Delhi.

Research Interests

- Partial Differential Equations (PDEs), Hyperbolic Conservation Laws
- Numerical Algorithms for PDE-based models of multidisciplinary applications
- Quantum-inspired algorithms for PDEs

Academic Positions

2021–Present **Associate Professor**, *Operations Management & Quantitative Techniques*, IIM Indore.

2015–2021 **Assistant Professor**, *Operations Management & Quantitative Techniques*, IIM Indore.

2014–2015 **Postdoctoral Fellow**, *Accumes, INRIA*, Sophia Antipolis, France.

Research Visits

May 2024 **Visiting Researcher**, *Penn State University*, USA, Host: Alberto Bressan.
PDE models for Traffic & Crowd Flow

May 2024 **Visiting Researcher**, *University of Maryland*, USA, Host: Deep Ray.
Physics-Informed Neural Networks for PDEs

July 2024 **Visiting Researcher**, *University of Bio Bio*, Chile, Host: Raimund Burger.
PDE Models for Sedimentation

July 2023 **Guest Researcher**, *Norwegian University of Science and Technology (NTNU)*, Trondheim, Norway, Host: Helge Holden.
PDE models for Traffic & Crowd Flow

May-June 2019 **Guest Researcher**, *University of Würzburg*, Germany, Host: Christian Klingenberg.
PDE Models for Fluid Flow

Research Contour

Journal Articles

2025 (**A.Aggarwal**, G.Vaidya and H.Holden) Error estimates for systems of nonlocal balance laws modelling dense multilane vehicular traffic. *Nonlinearity*,
10.1088/1361-6544/ae0b24
A* in AMS/SJR

2024 (**A.Aggarwal** and G.Vaidya) Convergence of the numerical approximations and well-posedness: Nonlocal conservation laws with rough flux. *Mathematics of Computation*,
https://doi.org/10.1090/mcom/3976
A in AMS/A* in SJR

2024 (**A.Aggarwal**, G.D.Veerappa Gowda and Sudarshan Kumar K.) A well-balanced second-order finite volume approximation for a coupled system of granular flow. *Journal of Computational Physics*,
https://doi.org/10.1016/j.jcp.2024.113068
A* in AMS/SJR

2024 (**A.Aggarwal**, G.Vaidya and H.Holden) Well-posedness and error estimates for coupled systems of nonlocal conservation laws. *IMA Journal of Numerical Analysis*,
https://doi.org/10.1093/imanum/drad101
A in AMS/A* in SJR

2024 (**A.Aggarwal**, G.Vaidya and H.Holden) On the accuracy of the finite volume approximations to nonlocal conservation laws. *Numerische Mathematik*,
https://doi.org/10.1007/s00211-023-01388-2
A* in AMS/SJR

2022 (A.Vijesh, **A.Aggarwal** and R.Roy) Adapted Monotone Iterative Finite Volume Algorithms for Coupled Systems of First Order Non-linear PDEs. *Zeitschrift für angewandte Mathematik und Mechanik*,
https://doi.org/10.1002/zamm.202200022
B in AMS/SJR

2021 (**A.Aggarwal**, G.Vaidya and G.D.Veerappa Gowda) Positivity-preserving numerical scheme for hyperbolic systems with δ-shock solutions and its convergence analysis. *Zeitschrift für angewandte Mathematik und Physik*, 72, 165
https://doi.org/10.1007/s00033-021-01590-y
A in AMS/SJR

2021 (V.Anand, L.Verma, **A.Aggarwal**, P.Nanjundappa and H. Rai) COVID-19 and Psychological Distress among Indians: A Predictive Model. *Plos One*, 16(8): e0255683
https://doi.org/10.1371/journal.pone.0255683
A in SJR

2020 (**A.Aggarwal**, M.R.Sahoo, A. Sen and G.Vaidya) Solutions with concentration for conservation laws with discontinuous flux and its applications to numerical schemes for hyperbolic systems. *Studies in Applied Mathematics*, 145(2), 247-290.
https://doi.org/10.1111/sapm.12319
A* in AMS

2016 (A.Adimurthi, **A.Aggarwal** and G.D.Veerappa Gowda) Godunov-Type Numerical Methods for a Model of Granular Flow on Open Tables with Walls. *Communications in Computational Physics*, 20(4), 1071-1105.
https://doi.org/10.4208/cicp.290615.060516a
A in SJR

2016 (A.Adimurthi, **A.Aggarwal** and G.D.Veerappa Gowda) Godunov-type numerical methods for a model of granular flow. *Journal of Computational Physics*, 305, 1083-1118.
`https://doi.org/10.1016/j.jcp.2015.09.036`
A* in AMS/SJR

2016 (**A.Aggarwal** and P.Goatin) Crowd dynamics through non-local conservation laws. *Bulletin of the Brazilian Mathematical Society, New Series,* 47(1), 37-50.
`https://doi.org/10.1007/s00574-016-0120-7`
B in SJR

2015 (**A.Aggarwal**, R.M.Colombo and P.Goatin) Nonlocal systems of conservation laws in several space dimensions. *SIAM Journal on Numerical Analysis*, 53(2), 963-983.
`https://doi.org/10.1137/140975255`
A* in AMS/SJR

Articles in Preparation

202x (**A.Aggarwal** and Ashwini N.) Stability Estimates for Nonlocal conservation laws.

202x (**A.Aggarwal** and G. Vaidya) Nonlocal conservation laws with memory and the effect of fading memory

Research Guidance

2019,22,25 Ganesh Kiran Vaidya, Research Associate,
Currently, Assistant Professor, Indian Institute of Science, Bengaluru

2023- Ashwini N., Ph.D. Student (Jointly with Dr. Sarvesh Kumar),
Indian Institute of Space Science and Technology, Thiruvananthapuram

Thesis Advisory Committee

EFPM 2021 Sultan Amed, *OM & QT*

EFPM 2023 Sucheta Jha, *Marketing Management*

EFPM 2020 Kuldeep Dattatraya Ghorapade, *Marketing Management*

Ph.D. Thesis Examiner

Smriti Tiwari, Faculty of Mathematics, NIT Warangal

Reviewer in the peer reviewed journals

SIAM Journal of Numerical Analysis (AMS A*)

Zeitschrift für angewandte Mathematik und Physik (AMS A)

Journal of Dynamics and Differential Equations (AMS A)

Networks and Heterogeneous Media (AMS A)

Nonlinear Analysis: Real World Applications (AMS B)

Journal of Contemporary Business Research

Editorial Board

2021- Blackboard, the bulletin of the Mathematics Teachers' Association (India) (MTA(I))

2024- Journal of Innovation Sciences and Sustainable Technologies

Grants & Awards

2025– Toyota Mobility Foundation STAMP Challenge (Rs 20.72 L) – joint with IIT BHU & IIIT Tirupati

2025– ANRF/ARG Matrics Grant (Rs 25 L, 5 years)

2024–25 Visiting Researcher Grant by Center for Mathematical Modeling, University of Bio Bio, Chile

2019–20 Grant to Support Research Collaboration by Visiting Other Institutions, IIM Indore, *Research Visit to Department of Mathematics, University of Würzburg, Germany*

2011-12 National Board of Higher Mathematics and TIFR Grant, *Research Visit to Department of Mathematics, Brown University, USA*

Teaching Experience

Teaching at IIM Indore

IPM Differential & Integral Calculus, Numerical Analysis, Linear Algebra, Fundamentals of Mathematics & Statistics, Ordinary Differential Equations and their Applications, Understanding Social Networks through Data Analytics, Supervised Machine Learning for Business Problems, Social Network Analysis

EFPM / FPM Introduction to Business Statistics, Probability & Statistics, Understanding Social Networks through Python, Social Network Analysis, Research Course in Operations and Quantitative Area

PGPHRM Introduction to Social Science Research and Probability & Statistics

Executive / MDP/ MSDSM Quantitative Technique For Materials Management, Decision Making, Problem Solving, Mental Health and Wellbeing at Work, Social Network Analysis, Statistics & Probability

Teaching Consultancy

2025-26 Calculus, *IPM Programme, IIM Amritsar*

2022-23 Business considerations in prioritizing Quantum Computing by Industry, *Quantum Computing for Managers, Qkrishi*

2020-21 Stress Management - With a Special Focus on COVID-19, *L.E.A.D., the e-Learning Series, Ortho Clinical Diagnostics*

Administration

2025-26 Chair, *PhD. Comprehensive Examination Committee, OM&QT*

2024– Member, *EPGP Executive Committee, IIM Indore*

2024– Member, *Assurance of Learning (AOL) Committee for Integrated Programme in Management, IIM Indore*

2023– Member, *Committee for IT Facilities and ERP, IIM Indore*

2018–2019 Member, *Committee for Workload norms' review, IIM Indore*

2017–2018 Co-Coordinator, *MDP (Logistics) for Officers in Services, Indian Army (ARTRAC), IIM Indore*
Coordinator, *MDP (General-II) For Indian Army Officers*

2016–2018 Co-Coordinator, *General Management Programme for Executives (GMPE)*, IIM Indore

Consultancy/Community Services/Outreach

2025- Member, Textbook Development Team, *NCERT Mathematics Book, Class XI-XII*

2025-26 Panelist in "Understanding the Teaching of Calculus in School and College", *Azeem Premji University, Bengaluru*

2024- Member of Academic Council, *Prestige Institute of Engineering Management & Research, Indore*

2024-25 Advisory Member, *SAGE University, Indore*

2024-25 Instructor in workshop on Partial Differential Equations: Analysis and its Applications, *ABV-IIITM Gwalior*

2023-24 Participation at Resonance outreach program organized by Indian Academy of Science Bengaluru for undergraduate students from Kashmir. Talk and interaction with students

2023-24 Instructor for UGC-Sponsored Online Refresher Course in Mathematics of HRDC, Bharathidasan University, Tiruchirappalli

2022-23 Panelist in "History of Modern Mathematics", IIT Indore

2020-21 Co-Authored Newspaper Article, Times of India (With V. Anand and H. Rai), *Community Resilience: Are we prepared today to thrive tomorrow?*

2020-21 Volunteered for arrangement of Navyodya Admission Drive for IIMI Community in collaboration with I-help.

2018-19 Mentored a students' Industry Project in Post Graduate Programme of Big Data and Machine Learning, *Great Lakes, Hyderabad*

2017-21 Admission Aid for Primary School Admissions Under RTE.

Workshops/Conferences (during service at IIM Indore), 2021 onwards

2025–26 HBS Global Colloquium on Participant-Centered Learning, Harvard Business School, USA

2025-26 Non-Local Conservation Laws, Modelling Traffic Flow and Crowd Dynamics, *Indo-European Conference on Mathematics, Pune, India*

Stability estimates for Non-Local Conservation Laws Modeling Traffic Flow and Crowd Dynamics *Recent Developments in Applied and Computational Mathematics, IIST, Thiruvanthapuram, India*

2024-25 Invited participant at Exclusive Workshop: Becoming Quantum Ready, *NVIDIA AI Summit, Mumbai, India*

Second Order Well Balanced Schemes for a Model of Granular Flow, *SIAM Conference on Mathematical Aspects of Materials Science (MS24), Pittsburgh, USA*

Higher Order Numerical Approximations for Multilane Vehicular Traffic, *Annual Conference of the Indian Society for Mathematical Modeling and Computer Simulation, South Asis University, India*

2022-23 Some Existence Results for Non-Local Scalar Conservation Laws with Discontinuous Flux, *XVIII International Conference on Hyperbolic Problems, EDANYA Group, University of Malaga , Spain*

Recent Results in Numerical approximations of Hyperbolic Systems, *International Conference on Computational Partial Differential Equations and Applications, BML Munjal University, India*

Non-Local Conservation Laws with Discontinuous velocity Vector Field, *The Ramanujan Mathematical Society , SSN College, India*

2021-22 Crowd Dynamics, Traffic Flow and Beyond, *Resonance Lecture Series*

Numerical Approximations of Hyperbolic Conservation Laws Modeling Physical Problems, *SIAM Conference on Analysis of Partial Differential Equations*

References

G.D.Veerappa Gowda — Former Dean and Professor, TIFR Centre for Applicable Mathematics
Professor, Ecole Centrale School of Engineering, Mahindra University
Email: veerappa.gowda@mahindrauniversity.edu.in

Helge Holden — Professor
Department of Mathematical Sciences, Norwegian University of Science and Technology NTNU, Trondheim
Email: helge.holden@ntnu.no

Abhishek Mishra — Professor(Marketing)
Indian Institute of Management, Indore
Email: abhishek@iimidr.ac.in

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INdAM Unit, University of Brescia, Italy
Email: rinaldo.colombo@unibs.it