Aekta Aggarwal

Personal Data

Date of 10.08.1985 Birth: Affiliation: Operations Management and Quantitative Techniques, Indian Institute of Management, Indore Specialization: Applied Mathematics, Differential Equations Phone: +91-9742-734-973 Email: aektaaggarwal@iimidr.ac.in Webpage: in, 😗, R⁶ Education 2006–2014 Integrated M.Sc-Ph.D.in Mathematics, Centre for Applicable Mathematics, Tata Institute of Fundamental Research, Bangalore. 2003–2006 B.A.(Honours) Mathematics, Lady Shri Ram College for Women, University of Delhi, 84.2%. Research Interests • Partial Differential Equations, Hyperbolic Conservation Laws • Analysis of Numerical Algorithms for PDE based models of multidisciplinary applications Experience May 2024 Visiting Researcher, DEPARTMENT OF MATHEMATICS, Penn State University, USA. Host: Alberto Bressan, Professor, PSU. Project: Analysis of systems of PDE models for traffic and crowd flow. May 2024 Visiting Researcher, DEPARTMENT OF MATHEMATICS AND BRIN MATHEMATICS CENTER, University of Maryland, USA. Host: Deep Ray, Assistant Professor, University of Maryland. Project: Physics Informed Neural Networks for PDE models for traffic and crowd flow. June 2024 Visiting Researcher, CENTER FOR MATHEMATICAL MODELING, University of Bio Bio, Chile. Host: Raimund Burger, Professor, University of Bio Bio, Chile. Project: for PDE models for sedimentation. 01- Guest Researcher, DEPARTMENT OF MATHEMATICAL SCIENCES, Norwegian University of 31.07.2023 Science and Technology NTNU, Trondheim. Host: Helge Holden, Professor, NTNU. Project: Analysis of PDE models for traffic and crowd flow. 18.06.2021- Associate Professor, OPERATIONS MANAGEMENT AND QUANTITATIVE TECHNIQUES, Indian Institute of Management, Indore. 15.05- Guest Researcher, DEPARTMENT OF MATHEMATICS, The Julius Maximilians University of 01.07.2019 Würzburg, Germany. Host: Christian Klingenberg, Professor, University of Würzburg. Project: Analysis of PDE models for fluid flow.

15.07.2015 – Assistant Professor, OPERATIONS MANAGEMENT AND QUANTITATIVE TECHNIQUES, Indian 18.06.2021 Institute of Management, Indore.

01.03.2014– Post Doctoral Fellow, ACCUMES, INRIA, Sophia Antipolis, France.

01.02.2015

Host: Paola Goatin, Senior Researcher, INRIA, Sophia Antipolis, France. Project: Analysis of PDE models for crowd dynamics.

Publications

Journal Articles

- 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
- 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
- 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.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
- 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
- 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
- 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
- 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
- 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
- 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.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 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

Under Review

2023 (A.Aggarwal, G.Vaidya and H.Holden) Systems of nonlocal balance laws for dense multilane vehicular traffic.

Teaching Experience

Teaching Consultancy

- 2022-23 Business considerations in prioritising 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

Academic Programmes at IIM Indore

2022–2024 Introduction to Business and Statistics, Core, Term I, *Executive Fellow Programme in Management(EFPM)*

Understanding Social Networks through Data Analytics(Workshop Course), Elective, Term VII, *Integrated Programme in Management (IPM)*

Understanding Social Networks through Python, Elective, Term V, *Fellow Programme in Management(FPM)*

- 2022–2023 Introduction to Social Science Research and Probability & Statistics, Core, Term 2, *The Post Graduate Programme in Human Resource Management (PGP-HRM)*
- 2020–2022 Supervised Machine Learning for Business Problems, Workshop, Term VIII, Integrated Programme in Management (IPM)
- 2016–2025 Differential Calculus, Core, Term 1, Integrated Programme in Management (IPM)

Integral Calculus, Core, Term II, Integrated Programme in Management (IPM)

- 2020- Numerical Analysis,
- 2021,2024- Core, Term IV, Integrated Programme in Management (IPM) 2025
 - 2018–19 Research Course in Operations and Quantitative Area, Core, *Executive FPM (EFPM)*
- 2016–17, Mentor, Industry Interface Programme, *Post Graduate Programme in Management (PGP)*
- 2018–19
- 2015–16 Linear Algebra, Core, Term III, *Integrated Programme in Management (IPM)* Executive Programmes at IIM Indore
- 2020–2021 Mental Health and Wellbeing at Work: An Analytics Perspective, Elective, Batch 5, *General Management Programme for Executives (GMPE)*

2019–20 Quantitative Technique For Material Management, MDP (Logistics II) for Indian Army MDP(Logistics) for Indian Army

2018–19 Decision Making, Indian Army (ARTRAC), MDP (General I) for Combat Arms

> Reliability Maintenance, Indian Army (ARTRAC), MDP (Logistics) for Officers in Services,

Problem Solving and Decision Making, Indian Army (ARTRAC), MDP (General) For Combat Support Arms

Decision Making, Indian Army (ARTRAC), MDP (General II) for Combat Arms

2017–18 Problem Solving and Decision Making, Foundation Course in General Management, NTPC Raipur Foundation Course in General Management, NTPC Hyderabad

> Decision Making, MDP (General-II) For Indian Army Officers

Quantitative Technique For Material Management, *MDP(Logistics) for Officers in Services, ARTRAC*

Teaching Assistant at TIFR Centre for Applicable Mathematics

Spring 2013 Computational Methods for Partial Differential Equations, Core, *M.Sc.Mathematics*

Grants

- 2011-12 National Board of Higher Mathematics and TIFR Grant Research Visit to Department of Mathematics, Brown University, USA
- 2019-20 Grant to Support Research Collaboration by Visiting Other Institutions, IIM Indore Research Visit to Department of Mathematics, University of Würzburg, Germany
- 2023-24 Faculty Development Allowance, IIM Indore Research Visit to Department of Mathematics, NTNU, Norway
- 2024-25 Faculty Development Allowance, IIM Indore

Visiting Researcher Grant, Center for Mathematical Modeling, University of Chile

Visiting Researcher Grant, Department of Mathematics, Penn State University

Visiting Researcher Grant, Department of Mathematics and the Brin Mathematics Research Center, University of Maryland

Research Visit to Department of Mathematics, Penn State University, University of Maryland and University of Bio-Bio, Chile

Administration

2024-25	Member EPGP Executive Committee, IIM Indore
	Assurance of Learning(AOL) Committee for Integrated Programme in Management, IIM Indore
2023–2024	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, Batch 1 and 2 General Management Programme for Executives (GMPE), IIM Indore

Consultancy

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

Conferences (during service at IIM Indore)

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

2020-21 Algorithms for Capturing Concentration Solutions For PDEs A Class of ML Algorithms for Predicting Employee's Mental Health During Covid-19(With V.Anand) SIAM Conference on Computational Science and Engineering

Discontinuous flux based solvers for Approximation of Travelling Sand Dunes Advances in Differential Equations and Numerical Analysis, IIT Guwahati

Monotone Iterative Numerical Method for a Catalytic Converter Model (With R.Roy and V.Antony Vijesh)

Numerical Appromxations of Hyperbolic Conservation Laws Modeling Physical Problems, *Synergies in computational, mathematical, statistical and physical sciences*

Approximations of Hyperbolic Systems Using Conservation laws with Discontinuous Flux *Virtual Conference in honour of Prof.G.D.Veerappa Gowda, TIFR CAM*

2019-20 Godunov Type Solvers for Hyperbolic Systems based on Discontinuous Flux for Conservation Laws (With G.Vaidya and G.D.Veerappa Gowda) ICIAM 2019, Valencia 4th International Conference On Recent Developments In Theory, Computation & Application of

4th International Conference On Recent Developments In Theory, Computation & Application of Differential Equations, South Asian University

Godunov Type Solvers for Euler System with Friction Terms (With G.Vaidya and G.D.Veerappa Gowda)

ENUMATH 2019, Netherlands

Some Models for Granular Flow and Crowd Dynamics National Workshop on Computational Mathematics, DAVV, Indore

Discontinuous Flux Based Solvers for Euler Gas Dynamics in absence of Pressure CMA 2019, IIT Indore

Discontinuous Flux Based Solvers for 2×2 hyperbolic systems admitting $\delta-$ shocks PD 2019, La Quinta

2018-19 Teaching Calculus to Management Students MTA Conference 2019, HBCSE Mumbai 2015-16 Godunov-Type Numerical Scheme for a Model of Granular Flow for Partially Open Tables (With A.Adimurthi G.D.Veerappa Gowda) *Fifth Chilean Workshop on Numerical Analysis of Partial Differential Equations (WONAPDE 2016), Concepcion*

Applications of Non-Local Conservation Laws: Crowd Dynamics (With P.Goatin and R.Colombo) International Conference on Current Trends in PDEs: Theory & Computations, South Asian University

Community Services/Outreach

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

Volunteered for arrangement of

- Navyodya Admission Drive for IIMI Community in collaboration with I-help.
- Grocery, Food and Medicine Delivery to IIMI community during lockdown (post COVID-19 breakout.)
- 2017-21 Admission Aid for Primary School Admissions Under RTE.

Languages

Hindi Mothertongue

- English Fluent
- French Basic

Technical Skills

- LaTex Working Knowledge
- Python, Working Knowledge Matlab

References

Helge Holden Professor

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G.D.Veerappa Professor

Gowda Centre for Applicable Mathematics, Tata Institute of Fundamental Research, Bangalore, INDIA Email: gowda@tifrbng.res.in Webpage: https://www.math.tifrbng.res.in/people/gowda Phone no: +91-80-6695-3743

Rinaldo Professor

Colombo INdAM Unit, University of Brescia, Italy Email: rinaldo.colombo@unibs.it Webpage: https://rinaldo-colombo.unibs.it/ Phone no: +39-030-371-5460