Manmohan Vashisth

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Applied and Computational Mathematics Divison,
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Work

- **Beijing Computational Science Research Center (CSRC)** — Beijing, China
  Post-doctoral fellow — *December 2018 to present*
  - Mentor: Prof. Guang-Hui Hu
- **TIFR Centre for Applicable Mathematics** — Bangalore, India
  Post-doctoral fellow — *Aug - Nov, 2018*
  - Mentor: Dr. Venkateswaran P. Krishnan

Education

- **TIFR Centre for Applicable Mathematics** — Bangalore, India
  Doctor of Philosophy (Ph.D.) in Mathematics — *Aug 2015 to July 2018*
  - Advisor: Dr. Venkateswaran P. Krishnan
  - Title of thesis: Some Inverse Problems in Hyperbolic Partial Differential Equations
  - Ph.D. thesis defended on July 13, 2018
- **TIFR Centre for Applicable Mathematics** — Bangalore, India
  Master of Philosophy (M.Phil.) in Mathematics — *Aug 2014 to July 2015*
  - Advisor: Dr. Venkateswaran P. Krishnan
  - Title of thesis: Inverse Problems Related to Hyperbolic PDE and Hybrid Imaging
- **TIFR Centre for Applicable Mathematics** — Bangalore, India
  Master of Science (M.Sc.) in Mathematics — *July 15, 2012 to July 31, 2014*
  - Marks: 70 %
  - Courses Studied in 4 semesters of M.Sc.:

No.	**Semester 1**	**Semester 2**
1	General Topology	Functional Analysis
2	Linear Algebra	Measure Theory
3	Real Analysis	Basic Partial Differential Equations
4	Ordinary Differential Equations	Abstract Algebra
	Semester 3	**Semester 4**
1	Distribution Theory and Sobolev Spaces	Advanced Partial Differential Equations
2	Numerical Methods	Computational PDE
3	Complex Analysis	Differential Geometry
4	Probability and Statistics	Mechanics

- **Pt. Neki Ram Sharma Govt. College, Rohtak** — Haryana, India
  Bachelor of Science (B.Sc.) in Mathematics (Hons), Gold-Medalist: — *July 2009 to June 2012*

  - University name: Maharshi Dayanand University (MDU), Rohtak
  - Marks: 83%, 1st rank in University
  - Subjects: Calculus and advanced Calculus, Number Theory, Abstract Algebra, Discrete Mathematics, Fluid Dymanics, Mechanics, Differential equations, Real Analysis, Operation Research, Statistics, Co-ordinate Geometry in 2D and 3D, Integral equations, Vector calculus, Complex Analysis

- **Govt. Senior Secondary School, Rohtak** Haryana, India
  Passed 12th Grade in non-medical Sciences *March 2007 to March 2009*
  - Board of School Education Haryana (BSEH), India
  - Marks: 80%
  - Subjects: Hindi, English, Physics, Chemistry and Mathematics

- **Govt. High School, Kakrana, Rohtak** Haryana, India
  Passed 10th Grade *March 2002 to March 2007*
  - Board of School Education Haryana (BSEH), India
  - Marks: 80.6%
  - Subjects: English, Hindi, Mathematics, Science, Social Science and Sanskrit

Academic Visits

- Hokkaido University, Sapporo, Japan for a collaborative research with Prof. Gen Nakamura (Emeritus Professor at Hokkaido University) from March 10-31, 2018.
- Beijing Computational Science Research Center, Beijing, China from Feb 5-9, 2018.
- Nanyang Technological University, Singapore for participating in "Global Young Scientists Summit(GYSS)-2018"meeting from Jan 21-27, 2018.
- Hokkaido University, Sapporo, Japan for a collaborative research with Prof. Gen Nakamura (Emeritus Professor at Hokkaido University) from June 3 - July 2, 2017.

Research Interests

- Inverse problems related to partial differential equations
- Inverse problems in Hybrid Imaging
- Integral geometry
- Inverse scattering problems
- Partial differential equations

Publications or preprints

- An inverse problem for the relativistic Schrödinger equation with partial boundary data, with Venkateswaran P Krishnan, https://arxiv.org/abs/1801.04866 Accepted for publication in Applicable Analysis.

- Inverse problems for wave equation with under-determined data https://arxiv.org/abs/1706.00681 (Submitted-2017).
- Inverse Boundary Value Problem for Non-linear Hyperbolic Partial Differential Equations joint work with Gen Nakamura https://arxiv.org/abs/1712.09945 (Submitted-2017).
- A partial data inverse problem for a system of hyperbolic equations, joint work with Rohit Kumar Mishra, (A post-doctoral fellow at University of California, Santa Cruz) under preparation.
- A partial data inverse problem for the Schrödinger equation in a magnetic field with time-dependent coefficient, joint work with Suman Kumar Sahoo (A Ph.D. student at TIFR-CAM, Bangalore) under preparation.

Presentations and Invited Talks

- **A Miniworkshop on inverse problems and PDEs** CSRC, Beijing, China
  Some inverse problems in hyperbolic partial differential equations *Dec 10, 2018*

- **9th International Conference on Inverse Problems and Related Topics** NUS, Singapore
  Inverse boundary value problems for non-linear hyperbolic PDE *Aug 13, 2018*

- **Beijing Computational Science Research Center** Beijing, China
  Inverse problems for hyperbolic partial differential equations *Feb 7, 2018*

- **Conference on Recent Developments in PDE** TIFR-CAM, Bangalore, India
  Inverse problems for Hyperbolic PDE with partial data *Aug 18, 2017*

- **PDE seminar-talk at Hokkaido University** Sapporo, Japan
  Inverse problems for Hyperbolic PDE with partial data *June 16, 2017*

- **9th International Conference on Applied Inverse Problems** Zhejiang University, China
  Inverse problems for Hyperbolic PDE with partial data *June 2, 2017*

- **International Conference of TIMC in cooperation with AMS** IIT-BHU, India
  Inverse problems for Hyperbolic PDE with partial data *Dec 14, 2016*

- **International Conference on Mathematical Analysis & its Applications** IITR, India
  Inverse Problems for Wave Equation in 3-D with Under-determined Data *Dec 1, 2016*

- **The 8th International Conference "IPMS"** Izmir University, Turkey
  Inverse Problems for Wave Equation with Under-determined Data *May 26, 2016*

- **In-house Symposium Talk 2015** TIFR-CAM
  Inverse Problems in Hybrid Imaging *Aug 5, 2015*

- **M.Phil. thesis Presentation** TIFR-CAM
  Inverse Problems Related to Hyperbolic PDE and Hybrid Imaging *July 11, 2015*

Teaching Experience

- **Summer Workout in Mathematics (SWIM)** TIFR-CAM
  For undergraduate students *Teaching Assistant*
  Took Tutorial Classes for Participants *May 21 - June 15, 2018*
  - My job was to conduct the problem sessions on the topics in advanced calculus such as convergent of vector valued sequences, limits, continuity and differentiability of the functions of several real variables, Mean value theorem, Chain Rule etc.

- **Advanced Training in Mathematics School, Workshop** TIFR-CAM
  Advanced Instructional School in Linear PDE *Teaching Assistant*
  Took Tutorial Classes for Participants *July 3-8, 2017*
  - My job was to introduce the concepts of Tempered Distribution, Fourier transform, Fundamental Solutions for Constant Coefficient Operators, Bochner Integrals and Time-dependent Sobolev Spaces.

- **Functional Analysis** TIFR-CAM
  Teaching Assistant *Jan-May, 2017*
  Course Instructor *Shyam Sunder Ghoshal*
  - My job was to prepare assignments, grading and conduct problems discussion classes.

- **Instructional Schools for Teachers** TIFR-CAM
  Analysis and Differential Equations *Teaching Assistant*
  Took Tutorial Classes for Participants *Dec 7-19, 2015*
  - My job was to conduct problems discussion classes on mathematical Analysis.

- **PDE-2 (Distribution Theory and Sobolev Spaces)** TIFR-CAM
  Teaching Assistant *Aug-Dec, 2015*
  Course Instructor *Venky P. Krishnan*
  - My job was to grade assignments and conduct problems discussion classes.

- **Advanced Training in Mathematics School, Workshop** TIFR-CAM
  Partial Differential Equations of Fractional Order *Teaching Assistant*
  Took Tutorial Classes for Participants *July 6-18, 2015*
  - My job was to introduce the concepts of Distribution Theory and Fourier Transform to the participants and conduct the problems discussion classes.

- **Differential Geometry** TIFR-CAM
  Teaching Assistant *Jan-May, 2015*
  Course Instructor *Adimurthi*
  - My job was to grade the exam papers.

Awards, Grants and Honours

- **Tata Institute of Fundamental Research (TIFR)** post-doctoral fellowship during Aug-Nov, 2018.

- Financial support from my **Ph.D. supervisor's MATRICS (SERB-DST) grant and National University of Singapore (NUS)** during Aug 13-17, 2018 to attend and present my research work in "The 9th International Conference on Inverse Problems and related topics"organised by NUS, Singapore.
- Financial support from **National University of Singapore (NUS)** during Aug 6-11, 2018 to attend the tutorial classes on "Calderón's Problem"organised by NUS, Singapore.
- **Tata Institute of Fundamental Research (TIFR)** doctoral fellowship from Aug 1, 2015 to July 31, 2018.
- Financial support from **TIFR Centre for Applicable Mathematics, Bangalore, India and Japan Society for the Promotion of Science (JSPS)** during March 10-31, 2018, for a collaborative research visit to Prof. Gen Nakamura (Emeritus Professor) Hokkaido University, Sapporo, Japan.
- Financial support from **Beijing Computational Science Research Center (CSRC), Beijing China** during Feb 5-9, 2018, for an academic visit to Prof. Guanghui Hu at CSRC, Beijing, China.
- Financial support from **Tata Institute of Fundamental Research (TIFR), Mumbai, India and National Research Foundation, Singapore** during Jan 21-27, 2018 to participate in "Global Young Scientists Summit (GYSS-2018)"meeting organised by Nanyang Technological University, Singapore.
- Financial support from **Airbus chair at TIFR Centre for Applicable Mathematics, Bangalore, India and Japan Society for the Promotion of Science (JSPS)** during June 3 - July 2, 2017, for a collaborative research visit to Prof. Gen Nakamura (Emeritus Professor) Hokkaido University, Sapporo, Japan .
- Financial support from **Airbus chair at TIFR Centre for Applicable Mathematics, Bangalore, India** during May 29 - June 2, 2017, to attend and present the research work in "The 9th International Conference Applied Inverse Problems (AIP)"in Zhejiang University, Hangzhou, China.
- Financial support from **Zhejiang University** during May 26-28, 2017, to attend the tutorial classes on inverse problems organised by Zhejiang University, Hangzhou, China.
- Financial support from **TIFR Centre for Applicable Mathematics, Bangalore, India** during Dec 14-17, 2016, to attend and present the research work in "International Conference of The Indian Mathematics Consortium (TIMC) in cooperation with American Mathematical Society (AMS)"organised by DST-Centre for Interdisciplinary Mathematical Sciences, Banaras Hindu University(BHU), Varanasi, India.
- Financial support from **TIFR Centre for Applicable Mathematics, Bangalore, India** during Nov 28-Dec 2, 2016, to attend and present the research work in "International Conference on Mathematical Analysis and Applications (ICMAA-2016)"organised by Indian Institute of Techonology (IIT), Roorkee, India.
- Financial support from **Airbus chair at TIFR Centre for Applicable Mathematics, Bangalore, India** during May 23-28, 2016, to attend and present the research work in "The 8th International Conference Inverse Problems: Modelling & Simulation (IPMS)"organised by Izmir University, Turkey.
- Achieved 39th position in **CSIR-JRF NET** exams in June, 2014.

- Achieved 49th position in **CSIR-UGC NET** exams in December, 2013.
- **Tata Institute of Fundamental Research (TIFR)** masters fellowship from July 15, 2012 to July 31, 2015.
- Achieved 36th rank in **IIT-JAM (MA)** in 2012.
- Awarded **Gold-Medal in Maharshi Dayanand University (MDU), Rohtak** for securing the first position in university exams "B.Sc. Mathematics Honours"course for the batch 2009 to 2012.
- **Kishore Vaigyanik Protsahan Yojana (KVPY)** fellowship (SP-1101414) from 2010 to 2012.
- **Haryana board** merit scholarship from 2009 to 2010.

Conferences and Workshops Attended:

- **The 9th International Conference on Inverse Problems (ICIP) and Related Topics** during Aug 13-17, 2018, Singapore, organised by National University of Singapore (NUS), Singapore.
- **Advanced Instructional School (AIS) on Several Complex Variables** during June 11-23, 2018, organised by Department of Mathematics, Indian Institute of Science (IISC) Bangalore, India.
- Conference on **Recent Developments in Partial Differential Equations** during Aug 18-19, 2017, organised by TIFR Centre for Applicable Mathematics (CAM), Bangalore, India on the Occasion of 10th year celebration of TIFR-CAM at Yelahanka Campus.
- **The 9th International Conference on Applied Inverse Problems (AIP-2017)** during May 29-June 2, 2017, Hangzhou, China, organised by School of Mathematical Sciences, Zhejiang University, Hangzhou, China.
- **International Conference of The Indian Mathematics Consortium (TIMC) in cooperation with American Mathematical Society(AMS)** during Dec 14-17, 2016, organised by DST-Centre for Interdisciplinary Mathematical Sciences, Banaras Hindu University(BHU), Varanasi-221005.
- **International Conference on Mathematical Analysis and Application (ICMAA-2016)** during Nov 28 - Dec 2, 2016, organised by Indian Institute of Technology, Roorkee, India.
- **The 8th International Conference "Inverse Problems: Modelling & Simulation (IPMS)** during May 23-28, 2016, Oludeniz-Fethiye, Turkey Organised by Izmir University, Ecole Polytechnique and The Eurasian Association on Inverse Problems (EAIP).
- **Instructional Schools for Teachers on Analysis and Differential equations** during Dec 7-19, 2015, organised by TIFR Centre for Applicable Mathematics, Bangalore, India.
- **Advanced training in Mathematics Workshop (ATMW) on Partial Differential Equations of Fractional Order** during July 6-18, 2015, organised by TIFR Centre for Applicable Mathematics, Bangalore, India.
- **Advanced Instructional School on Theoretical and Numerical Aspects of Inverse problems** during June 16-28, 2014, organised by TIFR Centre for Applicable Mathematics, Bangalore, India.

- **Vigyan Jyoti Shivir Camp (Vijyoshi Camp)** during Dec 26-28, 2011, organised by Indian Institute of Science (IISC) Bangalore, India, for KVPY and Inspire fellows.
- **Summer Programme** during June 6-10, 2011, organised by Indian Institute of Science Education and Research (IISER) Mohali, India, for KVPY and Inspire fellows.

Advanced Courses and Lectures attended:

- Singular Integrals
- Degree Theory
- A general course on Stochastic process
- Linear Hyperbolic Partial Differential Equations.
- Parabolic Partial Differential Equations.
- Lectures on Pseudo-differential operators.
- Course on Riemannian Geometry.

References

- Prof. Guang-Hui Hu, Faculty member at Beijing Computational Science Research Center, Beijing, China
  E-mail: hu@csrc.ac.cn
  https://www.csrc.ac.cn/en/people/faculty/169.html
- Dr. Venkateswaran P. Krishnan, Faculty Member at TIFR Centre for Applicable Mathematics Bangalore, India
  E-mail: vkrishnan@math.tifrbng.res.in
  http://math.tifrbng.res.in/~vkrishnan/
- Prof. Gen Nakamura, Emeritus Professor, Department of Mathematics, Hokkaido University, Sapporo, Japan
  E-mail: nakamuragenn@gmail.com
  http://math.inha.ac.kr/~nakamura/
- Prof. A. S. Vasudeva Murthy, Faculty Member at TIFR Centre For Applicable Mathematics Bangalore, India
  E-mail: vasu@math.tifrbng.res.in
  https://www.math.tifrbng.res.in/people/vasu