Deepanshu Verma

Curriculum Vitae
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Education

2018 - 2021 **Ph.D. in Mathematics** | George Mason University, Fairfax, VA
Advisor: Prof. Harbir Antil
GPA: 4.0

2015 - 2018 **M.Sc. in Mathematics** | Indian Institute of Technology (IIT) Bombay, Mumbai, India
CPI: 9.65/10

2012 - 2015 **B.Sc.(Hons.) in Mathematics** | Shri Guru Teg Bahadur Khalsa College, Delhi University, India.
Percentage: 95%

Professional Experience

2021 - Present **Distinguished Visiting Assistant Professor** | Emory University, Department of Mathematics, Atlanta, GA

Research Interests

PDE Constrained Optimization | Fractional PDEs | Inverse Problems | Numerical Analysis | Machine Learning

Research Experience

2018 - 2021 **Graduate Research Assistant**
George Mason University, Fairfax, VA
Advisor: Dr. Harbir Antil

Summer 2021 **Summer Graduate Computing Student Intern**
Lawrence Livermore National Lab, Livermore, CA
Mentor: Dr. Boyan Lazarov, Dr. Vladimir Zdravkov Tomov

Summer 2019 **Summer Research Intern**
George Mason University, Fairfax, VA
Advisor: Dr. Harbir Antil

Teaching Experience

Instructor

Fall 2021	Math 111: Calculus I	Emory University

Speaker

Fall 2020	PDE Control and Learning from Data Seminar*	George Mason University
Spring 2020	PDE Control and Learning from Data Seminar*	George Mason University
Fall 2019	PDE Control Seminar*	George Mason University
Fall 2018	PDE Control Seminar*	George Mason University

*For a list of topics, visit http://math.gmu.edu/pde-control-seminar.php.

Teaching Assistant

Feb 2020	Workshop on Finite Elements for Nonlinear and Multiscale Problems	Indian Institute of Sciences (IISc), Bangalore
Spring 2019	Moderator, Deep Learning and Optimization Discussion Group	George Mason University
2017 - 2018	Linear Algebra	Indian Institute of Technology Bombay

Preprints and Publications

• Submitted Articles

(1) H. Antil, T.S Brown, R. Löhner, F. Togashi, and **D. Verma**. Deep Neural Nets with Fixed Bias Configuration.

(2) H. Antil, T.S. Brown, R. Khatri, A. Onwunta, **D. Verma**, and M. Warma. Optimal Control, Numerics, and Applications of Fractional PDEs.

(3) H. Antil, H.C. Elman, A. Onwunta, **D. Verma**. Novel Deep Neural Networks for Solving Bayesian Statistical Inverse Problems.

(4) H. Antil, R. Arndt, C. N. Rautenberg, and **D. Verma**. Non-Diffusive Variational Problems with Distributional and Weak Gradient Constraints.

• Published/Accepted

(1) H. Antil, T.S. Brown, **D. Verma** and M. Warma. Optimal Control of Fractional PDEs with State and Control Constraints. Accepted in *Pure and Applied Functional Analysis 2021.*

(2) T.S. Brown, H. Antil, R. Löhner, F. Togashi, and **D. Verma**. Novel DNNs for Stiff ODEs with Applications to Chemically Reacting Flows. Accepted in *Computational Fluid Dynamics Simulations and Analysis (CFDML) 2021.* arXiv: https://arxiv.org/pdf/2104.01914.pdf.

(3) H. Antil, R. Khatri, R. Löhner and **D. Verma**. Fractional Deep Neural Network via Constrained Optimization. *Machine Learning: Science and Technology 2020.* DOI: https://doi.org/10.1088/2632-2153/aba8e7.

(4) H. Antil, **D. Verma** and M. Warma. Optimal Control of Fractional Elliptic PDEs with State Constraints and Characterization of the dual of Fractional Order Sobolev Spaces. *J Optim Theory Appl (2020).* DOI: https://doi.org/10.1007/s10957-020-01684-z.

(5) H. Antil, **D. Verma** and M. Warma. External Optimal Control of Space-Time Fractional Prabolic PDEs. *ESAIM: COCV 26 (2020) 20.* DOI: https://doi.org/10.1051/cocv/2020005.

Honors and Awards

- Travel Award from SIAM to present at SIAM Annual Meeting (AN21), July 2021. (virtual)
- George Mason University, **Presidential Merit Fellowship**, 2018 - 2021.

- Travel Award from SIAM to present at SIAM Conference on Computational Science and Engineering (CSE21), March 2021. (virtual)
- George Mason University, **Dean's Graduate Award for Excellence**, 2019-2020.
- George Mason University, **Presidential Scholar Summer Research Fellowship**, Summer 2020.
- Local support from conference organizing committee to attend Workshop on Finite Elements for Nonlinear and Multiscale Problems, Indian Institute of Sciences (IISc), Bangalore, India, February 2020.
- Local support from conference organizing committee to present at Special Semester on Optimization, Johann Radon Institut (RICAM), Linz, Austria, October 2019.
- Office of the Provost, George Mason University, **Graduate Student Travel Fund (GSTF)** to present at Sixth International Conference on Continuous Optimization at TU Berlin, Germany, August 2019.
- Financial Support Grant from conference organizing committee to present at Sixth International Conference on Continuous Optimization (ICCOPT) at TU Berlin, Germany, August 2019.
- Department of Mathematics, George Mason University, **Achievements in Analysis Award**, May 2019.
- Travel Award from conference organizing committee to attend Workshop on Dynamics, Control and Numerics for Fractional PDEs, San Juan, Puerto Rico, December 2018.
- 2017 - 2018: Indian Institute of Technology, Bombay, **Ph.D. Scholarship**.
- 2017: M.Sc. Mathematics, Indian Institute of Technology, Bombay, **Institute Silver Medal** for academic excellence.
- 2017: M.Sc. Mathematics, Indian Institute of Technology, Bombay, **Mrs. Rama Mathur Award** for securing highest CPI (GPA).
- 2017: M.Sc. Mathematics, Indian Institute of Technology, Bombay, **Prof. P.V. Sukhatme Memorial Prize Award** for securing highest CPI (GPA).
- 2017: **Graduate Aptitude test in Engineering in Mathematics**, All India Rank: 70.
- 2016: **Junior Research Fellowship Awardee**, All India Rank: 09.
- 2015: B.Sc.(H) Mathematics, Shri Guru Teg Bahadur Khalsa College, Delhi University, India, **1st rank holder.**

Conferences and Workshops

- July 2021: **Co-organizer** of three-part minisymposium on Advances in Shape Optimization Algorithms, SIAM Conference on Optimization (OP21).
- March 2021: **Co-organizer** of two-part minisymposium on Optimal Control and Deep Learning, SIAM Conference on Computational Science and Engineering (CSE21).

- July 2021: **Minisymposium speaker**. Nonlocal Problems in Analysis and Numerics, SIAM Annual Meeting (AN21). (virtual)
- March 2021: **Minisymposium speaker**. Optimal Control and Deep Learning, SIAM Conference on Computational Science and Engineering (CSE21). (virtual)
- November 2020: Finite Element Circus (virtual).
- September 2020: Sayas Numerics Seminar (virtual). Link to video: zoom
- September 2020[†]: **Minisymposium speaker**. Optimal Control and Optimization for nonlocal and fractional problem. IFIP TC7 Conference on System Modelling and Optimization, Quito, Ecuador.
- September 2020[†]: **Minisymposium speaker**. Nonlocal PDEs and Calculus of Variations. IFIP TC7 Conference on System Modelling and Optimization, Quito, Ecuador.
- July 2020[†]: **Minisymposium speaker**. Modelling with Fractional PDEs: Numerical Analysis and Applications. The Second Joint SIAM/CAIMS Annual Meeting 2020, Toronto, Canada.
- May 2020[†]: Sayas Numerics Day, University of Maryland, Baltimore County.
- May 2020[†]: **Minisymposium speaker**. Numerical Methods for Optimization Problems with PDE Constraints. Second International Conference on Computational Methods and Applications in Engineering (ICCMAE), Mississippi State University.
- April 2020[†]: East Coast Optimization Meeting 2020, George Mason University, Fairfax, VA.
- March 2020[†]: 16th Copper Mountain Conference on Iterative Methods, Copper Mountain, CO.
- March 2020[†]: **Minisymposium speaker**. Recent Developments in Nonlocal Continuum Modeling. 44th SIAM Southeastern Atlantic Section Conference, Auburn University, Auburn.
- November 2019: **Co-Organizer** of SIAM Symposium, SIAM Student Chapter GMU.
- November 2019: Finite Element Circus, Virginia Tech, Blacksburg, VA.
- October 2019: **Invited talk** at Special Semester on Optimization, Johann Radon Institut (RICAM), Linz, Austria.
- October 2019: Student Research Talks (StReeTs), George Mason University.
- August 2019: **Minisymposium speaker**. Fractional/Nonlocal PDEs: applications, control, and beyond. Sixth International Conference on Continuous Optimization, TU Berlin, Germany.
- May 2019: DelMar Numerics Day 2019, University of Maryland, College Park.
- April 2019: East Coast Optimization Meeting 2019, George Mason University, Fairfax, VA.

[†] *Did not take place due to COVID*

Professional Services

- Fall 2019 - Fall 2021: **Executive Board Member**, SIAM, Student Chapter GMU.
- April 2020: **Support Team Member and SIAM Representative**, Annual East Coast Optimization Meeting, George Mason University. April 2-3, 2020, http://math.gmu.edu/~hantil/ECOM/2020/.
- March 2020: **Reviewer**, Spring 2020 Mason Core assessment.
- September 2019: **Volunteer**, Departmental Tea/Coffee time organized by Department of Mathematics in Fall 2019.
- Fall 2019 - Fall 2021: **Student Coordinator**, PDE-Control Seminar, George Mason University.
- April 2019: **Support Team Member**, Annual East Coast Optimization Meeting, George Mason University. April 4-5, 2019, http://math.gmu.edu/~hantil/ECOM/2019/.
- 2018: **Volunteer Grader**, Northern VA Regional MATHCOUNTS Competition, George Mason University, Fairfax, VA.
- Fall 2018: **Volunteer**, Mason Experimental Geometry Lab (MEGL) Outreach for middle school students.
- March 2018: **Student Volunteer**, New Directions in PDE Constrained Optimization, Indian Institute of Technology, Bombay.
- July 2016 - 2017: Core team member of Public Relation team in Mathematics Olympiad, conducted by Mathematics Association of IIT Bombay.
- May 2016 - 2017: Member of the Institute Student Companion Programme (ISCP), a programme within the IIT Bombay with the primary objective of aiding in the overall development of the new entrants.

Professional Memberships

- 2018 - Present: Member of the American Mathematical Society (AMS).
- 2018 - Present: Member of the Association for Women in Mathematics (AWM), Student Chapter GMU.
- 2018 - Present: Member of the Society for Industrial and Applied Mathematics (SIAM).

Programming

C++ | Matlab | Python | TEX| Mathematica