

# Dr. Abhinav Jha

**Date of Birth:** 2<sup>nd</sup> July 1994 ◊ **Place of Birth:** New Delhi, India

**Current Address:** Indian Institute of Technology, Gandhinagar, Gujarat ◊ [abhinav.jha@iitgn.ac.in](mailto:abhinav.jha@iitgn.ac.in)

## Research Interests

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Numerical Analysis of Partial Differential Equations, Stabilization Methods for Convection Dominated Problems, A Posteriori Error Estimates, Domain Decomposition Methods in Computational Chemistry, Scientific Computing, including writing scientific software.

## Work Experience

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### Indian Institute of Technology, Gandhinagar

October 2024 - Present

Assistant Professor, Grade 1  
Department of Mathematics

### Universität Stuttgart, Stuttgart

September 2022 - August 2024

Postdoctoral Researcher, Mathematics.  
Group: Numerical Mathematics for High Performance Computing  
Advisor: Prof. Dr. Benjamin Stamm.

### RWTH Aachen University, Aachen

January 2021 - August 2022

Postdoctoral Researcher, Mathematics.  
Group: Applied and Computational Mathematics  
Advisor: Prof. Dr. Benjamin Stamm.

## Education

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### Freie Universität, Berlin

October 2017 - October 2020

PhD, Mathematics.  
Grade: Magna cum Laude  
Title: Numerical Algorithms for Algebraic Stabilizations of Scalar Convection-Dominated Problems.  
Advisor: Prof. Dr. Volker John.

### Indian Institute of Technology, Roorkee

July 2015 - July 2017

Master of Science, Mathematics.  
CGPA: 9.59/10.0  
Title: Finite Element Method for Population Balance Equations.  
Advisor: Prof. Dr. Ankik Kumar Giri.

### St. Stephen's College, University of Delhi

July 2012 - July 2015

Bachelor of Science, Mathematics.  
Overall Percentage: 89.3%

## Publications

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### Published

- Thiago Carvalho Corso, Muhammad Hassan, **Abhinav Jha**, and Benjamin Stamm: *Trace estimates for harmonic functions along circular arcs with applications to domain decomposition on overlapping disks*. SIAM Journal on Mathematical Analysis, -, -, (to appear), 2025, **Q1**, IF: 1.9.
- Petr Knobloch, Dmitri Kuzmin, and **Abhinav Jha**: *Well-balanced convex limiting for finite element discretizations of steady convection-diffusion-reaction equations*. Journal of Computational Physics, **518**, 113305, 10.1016/j.jcp.2024.113305, 2024, **Q1**, IF: 3.8.
- Michele Nottoli, Michael F. Herbst, Aleksandr Mikhalev, **Abhinav Jha**, Filippo Lipparini, and Benjamin Stamm: *ddX: Polarizable Continuum Solvation from Small Molecules to Proteins*. WIREs Computational Molecular Science, **14**, e1726, 10.1002/wcms.1726, 2024, **Q1**, IF: 27.0.
- **Abhinav Jha**: *Residual-based a posteriori error estimators for algebraic stabilizations*. Applied Mathematics Letters, **157**, 109192, 10.1016/j.aml.2024.109192, 2024, **Q1**, IF: 2.8.

- **Abhinav Jha**, Volker John, and Petr Knobloch: *Adaptive Grids in the Context of Algebraic Stabilizations for Convection-Diffusion-Reaction Equations*. SIAM Journal on Scientific Computing, **45**, B564-589, 10.1137/21M1466360, 2023, **Q1**, IF: 2.6.
- **Abhinav Jha**, Michele Nottoli, Aleksandr Mikhalev, Chaoyu Quan, and Benjamin Stamm: *Linear scaling computation of forces for the domain-decomposition linear Poisson-Boltzmann method*. The Journal of Chemical Physics, **150**, 104105, 10.1063/5.0141025, 2023, **Q1**, IF: 3.1.
- **Abhinav Jha**, Ondřej Pártl, Naveed Ahmed, and Dmitri Kuzmin: *An Assessment of Solvers for Algebraically Stabilized Schemes applied to Convection Diffusion Reaction Equations*. Journal of Numerical Mathematics, **31**, 79-103, 10.1515/jnma-2021-0123, 2023, **Q1**, IF: 4.0.
- **Abhinav Jha**: *Hanging Nodes for Higher-Order Lagrange Finite Elements*. Examples and Counterexamples, **1**, 100025, 10.1016/j.exco.2021.100025, 2021, **Q4**, IF: 0.7.
- **Abhinav Jha**: *A Residual Based A Posteriori Error Estimators for AFC Schemes for Convection-Diffusion Equations*. Computer and Mathematics with Applications, **97**, 86-99, 10.1016/j.camwa.-2021.05.031, 2021, **Q1**, IF: 2.5.
- **Abhinav Jha** and Volker John: *On basic iteration schemes for nonlinear AFC discretizations*. Boundary and Interior Layers, Computational and Asymptotic Methods BAIL 2018, **135**, 113-128, 10.1007/978-3-030-41800-7\_7, 2020, **QNA**, IF: NA.
- **Abhinav Jha** and Volker John: *A Study of Solvers for Nonlinear AFC Discretizations of Convection-Diffusion Equations*. Computer and Mathematics with Applications, **78**, 3117-3138, 10.1016/j.camwa.2019.04.020, 2019, **Q1**, IF: 2.5.

### Preprints

- Samir Karaa, Naveed Ahmed, and **Abhinav Jha**: *Symmetric Stabilized FEM for Time-Fractional Convection-Diffusion-Reaction Equations*. [arXiv].
- **Abhinav Jha** and Benjamin Stamm: *Domain decomposition method for Poisson-Boltzmann equations based on Solvent Excluded Surface*. [arXiv].

### Grants

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- **Algebraic Stabilization Schemes for Evolutionary Convection-Diffusion Equation**
  - DST INSPIRE Faculty Award
  - Funding Agency: *Department of Science and Technology*.
- **A Posteriori Error Estimation for Flux Corrected Transport Schemes**
  - Institute Research Grant
  - Funding Agency: *Indian Institute of Technology, Gandhinagar*.

### Presentation in Conferences

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- *Recent Advancements in a Posteriori Error Estimation for Algebraic Stabilizations*, ENUMATH 2025, 1<sup>st</sup> September – 5<sup>th</sup> September 2025, Heidelberg, Germany.
- *Domain Decomposition Methods for the Poisson-Boltzmann Equations*, 93<sup>rd</sup> Annual Meeting of the International Association of Applied Mathematics and Mechanics, 30<sup>th</sup> May – 2<sup>nd</sup> June 2023, Dresden, Germany.
- *Adaptive Grids for Algebraic Stabilizations of Convection-Diffusion-Reaction Equations*, SIAM Conference on Computational Science and Engineering (CSE23), 26<sup>th</sup> February – 3<sup>rd</sup> March 2023, Amsterdam, Netherlands.
- *Computation of Forces Arising from the Linear Poisson-Boltzmann Method in the Domain Decomposition Paradigm*, 92<sup>nd</sup> Annual Meeting of the International Association of Applied Mathematics and Mechanics, 15<sup>th</sup> – 18<sup>th</sup> August 2022, Aachen, Germany.
- *A Residual based a Posteriori Error Estimators for Algebraic Flux Correction Scheme*, 15<sup>th</sup> World Congress on Computational Mechanics & 8<sup>th</sup> Asian Pacific Congress on Computational Mechanics, 31<sup>st</sup> July – 5<sup>th</sup> August 2022, Yokohoma, Japan.

- *Adaptive Grids for Algebraic Stabilizations of Convection-Diffusion-Reaction Equations*, Workshop on Numerical Methods and Analysis in CFD, 5<sup>th</sup> – 8<sup>th</sup> July 2022, WIAS, Berlin, Germany.
- *Adaptive Grids for Algebraic Stabilizations of Convection-Diffusion-Reaction Equations*, 18<sup>th</sup> Workshop on Numerical Methods for Problems with Layer Phenomena, 24<sup>th</sup> – 26<sup>th</sup> March 2022, Hagen, Germany.
- *Residual based a Posteriori Error Estimators for Algebraic Flux Correction Scheme*, Chemnitz Finite Element Symposium 2021, 6<sup>th</sup> – 8<sup>th</sup> September 2021, Online.
- *Residual based a Posteriori Error Estimators for Algebraic Flux Correction Scheme*, Bound-Preserving Space and Time Discretizations for Convection-Dominated Problems, BIRS & CMO, 22<sup>nd</sup> – 27<sup>th</sup> August 2021, Online, [**invited talk**].
- *Towards A Posteriori Error Estimators for Algebraic Flux Correction Scheme*, ESCO 2020, 7<sup>th</sup> International Congress of Computational Engineering and Sciences, 8<sup>th</sup> – 12<sup>th</sup> June 2020, Online.
- *On Numerical Simulations and a Posteriori Analysis for Algebraic Flux Correction Schemes*, MAFE-LAP 2019, The Mathematics of Finite Elements and Applications 2019, 17<sup>th</sup> – 21<sup>st</sup> June 2019, Brunel University, London.
- *On Numerical Simulations and a Posteriori Analysis for Algebraic Flux Correction Schemes*, The 28<sup>th</sup> Biennial Numerical Analysis Conference, 25<sup>th</sup> – 28<sup>th</sup> June 2019, University of Strathclyde, Glasgow.
- *Investigation of different solvers for nonlinear algebraic stabilizations of convection diffusion equations*, 13<sup>th</sup> International Workshop on Variational Multiscale and Stabilized Finite Elements, 5<sup>th</sup> – 7<sup>th</sup> December 2018, Weierstrass Institute for Applied Analysis and Stochastic, Berlin.
- *Study of Iterative Methods for Nonlinear AFC Discretizations on Convection-Diffusion Equations*, BAIL 2018, International Conference on Boundary and Interior Layers, 18<sup>th</sup> – 22<sup>nd</sup> June 2018, Glasgow, Scotland.

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## Organisation of Conferences

- *Minisymposium: Advances in Numerical Methods for Problems from Fluid Mechanics*, ENUMATH 2025, 1<sup>st</sup> September – 5<sup>th</sup> September 2025, Heidelberg, Germany.
- *Minisymposium: Special Methods in Computational Fluid Mechanics*, 15<sup>th</sup> World Congress on Computational Mechanics & 8<sup>th</sup> Asian Pacific Congress on Computational Mechanics, 31<sup>st</sup> July – 5<sup>th</sup> August 2022, Yokohoma, Japan.
- 8<sup>th</sup> *BMS Student Conference*, 19<sup>th</sup> – 22<sup>nd</sup> February 2020, Technische Universität, Berlin.

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## Research Visits

- Prof. Dr. Filippo Lipparini, Department of Chemistry and Industrial Chemistry, Università di Pisa, Italy; 27<sup>th</sup> – 30<sup>th</sup> March 2022.
- Prof. Dr. Benjamin Stamm, Applied and Computational Mathematics, RWTH Aachen University, Germany; 10<sup>th</sup> November – 24<sup>th</sup> December 2020.

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## Software

**ddPB-SES - Domain Decomposition for Poisson-Boltzmann Equation** *Language: MATLAB*  
*Universität Stuttgart, Stuttgart*

- Developed the Domain Decomposition method for Poisson Boltzmann Equation on SES cavity.
- Solves both the Linear and Non-Linear equation.

**ddX - Domain Decomposition Paradigm for Continuum Solvation Models** *Language: Fortran-90*  
*RWTH Aachen University, Aachen*

- Developed the Domain Decomposition Linear Poisson Boltzmann (ddLPB) sub-module.
- Co-developed the general framework of the package.

**ParMooN - Parallel Mathematics and object-oriented Numerics** *Language: C++*  
*Weierstraß Institute for Applied Analysis and Stochastic, Berlin*

- Developed the Algebraic Flux Correction package for Steady-State and Time-Dependent Convection-Diffusion Equations.
- Co-developed the a Posteriori Estimator package.

## Teaching Duties

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### Indian Institute of Technology, Gandhinagar

- Instructor for *MA643: Numerical Analysis of Partial Differential Equations*, Summer Semester, 2025.
- Instructor for *MA637: Numerical Analysis and Computing*, Winter Semester, 2024-2025.  
**Evaluation:** 3.57/4
- TA for *MA205: Calculus of Several Variables*, Summer Semester, 2025.
- TA for *MA203: Numerical Methods*, Winter Semester, 2024 - 2025.

### Univeristät Stuttgart

- TA for *Numerische Grundlagen für ernen, fmt, mach, mawie*, Summer Semester, 2024, 2023.
- TA for *Numerische Mathematik 1*, Winter Semester, 2023 .
- TA for *Numerical Methods for Differential Equations*, Summer Semester, 2023 .
- Supervisor for *Hauptseminar Numerische Analysis und Simulation*, Winter Semester, 2022 .
- TA for *Höhere Mathematik 3 für Ingenieurstudiengänge*, Winter Semester, 2022 .

### RWTH Aachen University

- TA for *Mathematische Grundlagen II (CES)*, Summer Semester, 2022 .
- TA for *Partial Differential Equations (CES+SiSc)*, Winter Semester, 2021 .
- TA for *Mathematische Grundlagen IV (CES)*, Summer Semester, 2021 .

### Freie Universität Berlin

- TA for *Numerical Methods for PDEs -Numerik III*, Summer Semester, 2019 .
- TA for *Numerical Methods for ODEs and Numerical Linear Algebra-Numerik II*, Winter Semester, 2018 .

\*TA = Teaching Assistant

## Supervision

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### Pinki Khatun

*Indian Institute of Technology, Gandhinagar*

May 2025 – October 2025

*PostDoc*

- Current Position: PostDoc at University of Florence, Italy
- Research Work: Physics Informed Embedded Neural Network

### Aditi Tomar

*Indian Institute of Technology, Gandhinagar*

May 2025 –

*PostDoc*

- Research Work: Time-Fractional Differential Equation

### Sarthak Sourav Dash

*Indian Institute of Technology, Gandhinagar*

July 2025 –

*PhD*

- Research Work: Adaptive Finite Element for Parabolic Problems

### Junghoon Lee

*Universität Stuttgart*

April 2023 – October 2023

*Masters*

- Research Work: A Posteriori Error Estimators for Laplace Eigenvalue Problems.

## Certifications

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**Machine Learning Specialisation**  
*Coursera*

*November 2023*

## Projects and Fellowships

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**Finite Element Method for Population Balance Equation**  
*Indian Institute of Technology Roorkee, India*

*January 2017 - May 2017*

- Developed Convergence Analysis of Finite Element Method (Collocation Method) for Population Balance Equations.

**Professor Nagpaul Fellowship**  
*St. Stephen's College, University of Delhi*

*October 2014 - May 2015*

- Researched on Network Optimization and its applications in daily life.

**Summer Research Fellowship**  
*Indian Institute of Science Bangalore, India*

*May 2014 - June 2014*

- Derived continuous time domain representation of Riesz Transform in two dimensions using Fourier transforms.

## Position of Responsibility

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**Indian Institute of Technology, Gandhinagar**

- Head of the Department Website.
- Co-organizer of the Foundation Program 2025.

**Berlin Mathematical School, Berlin**  
*Student Representative*

*December 2018 - December 2019*

- Member of the Executive board and the Admissions Committee.
- Organized the Career Event 2019.
- Organized the 8<sup>th</sup> BMS Student Conference.

**The Mathematics Society, St. Stephen's College**  
*President*

*July 2014 - July 2015*

- Initiated the Professor Nagpaul Fellowship.
- Initiated the Professor Mathur Memorial Lecture Series.
- Editor of Society Magazine, *Mathematica*.
- Organized *MathSoc Open 2014* and *MathSoc Open 2015*.

**Gandhi Study Circle, St. Stephen's College**  
*Vice President*

*July 2014 - July 2015*

- Coordinated the Regional Study Conference, August 2013.
- Member of the organizing team that held Mock Parliament, February 2014.

## Scholarships and Awards

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**DST INSPIRE Faculty Award**  
Ministry of Human Resources and Development, India.

*June 2025 - June 2030*

**BMS Phase 2 Scholarship**  
Berlin Mathematical School.

*October 2017 - September 2020*

**Dr. Gorakh Prasad Scholarship**  
Indian Institute of Technology, Roorkee.

*July 2015 - July 2017*  
1<sup>st</sup> Rank in Department

**INSPIRE Scholarship**  
Ministry of Human Resources and Development, India.

*July 2012 - July 2017*

**Department of Mathematics Leadership Award**  
St. Stephen's College, University of Delhi.

*April 2015*

**Kesar Devi Scholarship**  
St. Stephen's College, University of Delhi.

*April 2013*

## National Examinations

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**CSIR-UGC NET JRF**  
Rank : 28.

*June 2016*

**Joint Application test for M.Sc. (JAM)**  
Rank : 196.

*February 2015*

## Technical Strengths

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<b>Programming Language</b>	C++, Fortran
<b>Scripting Language</b>	Python
<b>Operating System</b>	Linux, MacOS
<b>Version Control</b>	Mercurial, Git
<b>Software &amp; Tools</b>	Mathematica, Matlab, L <sup>A</sup> T <sub>E</sub> X, Photoshop CS5

## Reviewer for Journals

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Journal of Computational and Applied Mathematics	<i>Elsevier</i>
International Journal of Computational Mathematics	<i>Taylor &amp; Francis</i>
SIAM Journal on Numerical Analysis	<i>SIAM</i>
MathSciNet	<i>AMS</i>
The Journal of Supercomputing	<i>Springer</i>
Mathematical Control and Related Fields	<i>AIMS</i>
Journal of Numerical Mathematics	<i>De Gruyter</i>
Multidiscipline Modeling in Materials and Structures	<i>Emerald Group</i>
Journal of Chemical Theory and Computation	<i>ACS Publications</i>
Zeitschrift für angewandte Mathematik und Physik	<i>Springer</i>

## References

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**Prof. Dr. Volker John** john@wias-berlin.de  
*Doctoral Supervisor*

· Freie Universität, Berlin & Weierstrass Institute for Applied Analysis and Stochastics.

**Prof. Dr. Benjamin Stamm** best@ians.uni-stuttgart.de  
*Postdoctoral Supervisor*

· Universität Stuttgart, Stuttgart.

**Prof. Dr. Petr Knobloch** knobloch@karlin.mff.cuni.cz  
*Research Collaborator*

· Charles University, Prague.

**Last update:**

*November 10, 2025*