

Abhinav Jha

Date of Birth: 2nd July 1994, **Place of Birth:** New Delhi, India

Current Address: Vaalser Straße, 72, Aachen 52064 ◊ (+49)15122407085 ◊ jha@acom.rwth-aachen.de

Research Interests

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

RWTH Aachen University, Aachen

November 2020 - Present

Postdoctoral Researcher, Mathematics.

Group: Applied and Computational Mathematics

Advisor: Prof. Dr. Benjamin Stamm.

Education

Freie Universität, Berlin

October 2017 - October 2020

PhD, Mathematics.

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: Dr. Ankik Kumar Giri.

St. Stephen's College, University of Delhi

July 2012 - July 2015

Bachelor of Science, Mathematics.

Overall Percentage: 89.3

Publications

Published

- 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, 10.1515/jnma-2021-0123, 2022.
- Abhinav Jha, *Hanging Nodes for Higher-Order Lagrange Finite Elements*, Examples and Counterexamples, **1**, 100025, 2021.
- Abhinav Jha, *A Residual Based A Posteriori Error Estimators for AFC Schemes for Convection-Diffusion Equations*, Computer and Mathematics with Applications, **97**, 86-99, 2021.
- 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, 2019.
- Abhinav Jha and Volker John, *On basic iteration schemes for nonlinear AFC discretizations*, In Gabriel R. Barrenechea and John Mackenzie, editors, Boundary and Interior Layers, Computational and Asymptotic Methods BAIL 2018, pages 113–128, Cham, 2020. Springer International Publishing.

Preprints

- Abhinav Jha, Michele Nottoli, Chaoyu Quan, and Benjamin Stamm, *Computation of forces arising from the linear Poisson-Boltzmann method in the domain-decomposition paradigm*, (submitted).

- Abhinav Jha, Volker John, and Petr Knobloch, *Adaptive Grids in the Context of Algebraic Stabilizations for Convection-Diffusion-Reaction Equations*, [arXiv] (submitted).
- Abhinav Jha and Naveed Ahmed, *Analysis of Flux Corrected Transport Schemes for Evolutionary Convection-Diffusion-Reaction Equations*, [arXiv].

Presentation in Conferences

- *A Residual based a Posteriori Error Estimators for Algebraic Flux Correction Scheme*, 15th World Congress on Computational Mechanics & 8th Asian Pacific Congress on Computational Mechanics, 31st July – 5th August 2022, Yokohoma, Japan.
- *Adaptive Grids for Algebraic Stabilizations of Convection-Diffusion-Reaction Equations*, Workshop on Numerical Methods and Analysis in CFD, 5th – 8th July 2022, WIAS, Berlin, Germany.
- *Adaptive Grids for Algebraic Stabilizations of Convection-Diffusion-Reaction Equations*, 18th Workshop on Numerical Methods for Problems with Layer Phenomena, 24th – 26th March 2022, Hagen, Germany.
- *Residual based a Posteriori Error Estimators for Algebraic Flux Correction Scheme*, Chemnitz Finite Element Symposium 2021, 6th – 8th 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, 22nd – 27th August 2021, Online, [invited talk].
- *Towards A Posteriori Error Estimators for Algebraic Flux Correction Scheme*, ESCO 2020, 7th International Congress of Computational Engineering and Sciences, 8th – 12th 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, 17th – 21st June 2019, Brunel University, London.
- *On Numerical Simulations and a Posteriori Analysis for Algebraic Flux Correction Schemes*, The 28th Biennial Numerical Analysis Conference, 25th – 28th June 2019, University of Strathclyde, Glasgow.
- *Investigation of different solvers for nonlinear algebraic stabilizations of convection diffusion equations*, 13th International Workshop on Variational Multiscale and Stabilized Finite Elements, 5th – 7th 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, 18th – 22nd June 2018, Glasgow, Scotland.

Organisation of Conferences

- *Minisymposium: Special Methods in Computational Fluid Mechanics*, 15th World Congress on Computational Mechanics & 8th Asian Pacific Congress on Computational Mechanics, 31st July – 5th August 2022, Yokohoma, Japan.
- 8th *BMS Student Conference*, 19th – 22nd February 2020, Technische Universität, Berlin,.

Software

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 - 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

- TA for *Mathematische Grundlagen II (CES)*, Summer Semester 2022, RWTH Aachen University.
- TA for *Partial Differential Equations (CES+SiSc)*, Winter Semester 2021/2022, RWTH Aachen University.
- TA for *Mathematische Grundlagen IV (CES)*, Summer Semester 2021, RWTH Aachen University.
- TA for *Numerical Methods for PDEs -Numerik III*, Summer Semester 2019, Freie Universität Berlin.
- TA for *Numerical Methods for ODEs and Numerical Linear Algebra-Numerik II*, Winter Semester 2018-19, Freie Universität Berlin.

Projects and Fellowships

Finite Element Method for Population Balance Equation

January 2017 - May 2017

Indian Institute of Technology Roorkee, India

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

Professor Nagpaul Fellowship

October 2014 - May 2015

St. Stephen's College, University of Delhi

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

Summer Research Fellowship

May 2014 - June 2014

Indian Institute of Science Bangalore, India

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

Position of Responsibility

Berlin Mathematical School, Berlin

December 2018 - December 2019

Student Representative

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

The Mathematics Society, St. Stephen's College

July 2014 - July 2015

President

- 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

July 2014 - July 2015

Vice President

- Coordinated the Regional Study Conference, August 2013.

- Member of the organizing team that held Mock Parliament, February 2014.

Scholarships and Awards

BMS Phase 2 Scholarship Berlin Mathematical School.	<i>October 2017 - September 2020</i>
Dr. Gorakh Prasad Scholarship Indian Institute of Technology, Roorkee.	<i>July 2015 - July 2017</i>
INSPIRE Scholarship Ministry of Human Resources and Development, India.	<i>July 2012 - July 2017</i>
Department of Mathematics Leadership Award St. Stephen's College, University of Delhi.	<i>April 2015</i>
Kesar Devi Scholarship St. Stephen's College, University of Delhi.	<i>April 2013</i>

Technical Strengths

Programming Language	C, C++, Fortran
Scripting Language	Python
Operating System	Linux, Windows, MacOS
Version Control	Mercurial, Git
Software & Tools	Mathematica, Matlab, MS Office, L ^A T _E X, Photoshop CS5

Reviewer for Journals

Journal of Applied and Computational Mathematics	<i>Elsevier</i>
International Journal of Computational Mathematics	<i>Taylor & Francis</i>

References

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| Prof. Dr. Volker John
<i>Doctoral Supervisor</i> | <code>john@wias-berlin.de</code> |
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- Freie Universität, Berlin & Weierstrass Institute for Applied Analysis and Stochastics.
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| Prof. Dr. Benjamin Stamm
<i>Postdoctoral Supervisor</i> | <code>best@acom.rwth-aachen.de</code> |
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- RWTH Aachen University, Aachen.
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| Prof. Dr. Ankik Kumar Giri
<i>Master Thesis Supervisor</i> | <code>ankikgiri.fma@iitr.ac.in</code> |
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- Indian Institute of Technology, Roorkee, India.
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| Dr. Naveed Ahmed
<i>Research Collaborator</i> | <code>ahmed.n@gust.edu.kw</code> |
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- Gulf University for Science & Technology, Kuwait.

Last update:

July 26, 2022