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

Organisation of Conferences

- *Minisymposium: Special Methods in Computational Fluid Mechanics*, 15^{th} World Congress on Computational Mechanics & 8^{th} Asian Pacific Congress on Computational Mechanics, 31^{st}July – 5^{th} August 2022, Yokohoma, Japan.
- 8^{th} *BMS Student Conference*, $19^{\text{th}} - 22^{\text{nd}}$ 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 8^{th} 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 *October 2017 - September 2020*
Berlin Mathematical School.

Dr. Gorakh Prasad Scholarship *July 2015 - July 2017*
Indian Institute of Technology, Roorkee.

INSPIRE Scholarship *July 2012 - July 2017*
Ministry of Human Resources and Development, India.

Department of Mathematics Leadership Award *April 2015*
St. Stephen's College, University of Delhi.

Kesar Devi Scholarship *April 2013*
St. Stephen's College, University of Delhi.

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, LaTeX, Photoshop CS5

References

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@acom.rwth-aachen.de
Postdoctoral Supervisor

· RWTH Aachen University, Aachen.

Prof. Dr. Ankik Kumar Giri ankikgiri.fma@iitr.ac.in
Master Thesis Supervisor

· Indian Institue of Technology, Roorkee, India.

Dr. Naveed Ahmed ahmed.n@gust.edu.kw
Research Collaborator

· Gulf University for Science & Technology, Kuwait.

Last update: *July 4, 2022*