

Dr. Muhammad Sohaib

Personal Information

Date of Birth	Febuary 25, 1990
Marital Status	Married
Nationality	Pakistani
Mobile No	+92-3469648868
Official Email	msohaib@bkuc.edu.pk
Email	m.sohaib99.ms@gmail.com
Skype	sohaibqau1
Office Address	Department of Mathematics and Statistics, Bacha Khan University, Charsadda, KP, Pakistan
Home Address	Street Budla Khel, Village and Post Office Bamkhel, Tehsil and District Swabi, KP, Pakistan

Education

2020–2024 **Ph.D. in Mathematics**, *COMSATS University, Islamabad*, Pakistan — QS Subject Rank: 140, *CGPA – 3.88/4.0*

2013–2015 **Masters of Science in Applied Mathematics (18 years)**, *Ghulam Ishaq Khan Institute of Engineering Sciences and Technology*, Topi, Swabi — QS Rank: 401-450, *GPA – 3.75/4.0*, Dean Honor Role

2011–2013 **Master of Science in Mathematics (16 years)**, *Quaid-i-Azam University*, Islamabad, Pakistan — QS Subject Rank: 150-200, *Percentage – 78.2*

2008–2010 **Bachelor of Science (14 years)**, *University of Peshawar*, Khyber Pakhtunkhwa, Pakistan, *Percentage – 78.3*, Distinction

2006–2008 **Higher Secondary School Certificate (Pre-Engineering) (12 years)**, *BISE Peshawar Khyber Pakhtunkhwa, Pakistan*, *Percentage – 72.9*

2004–2006 **Secondary School Certificate (Science Group) (10 years)**, *BISE Mardan*, Khyber Pakhtunkhwa, Pakistan, *Percentage – 77.6*

Ph.D. Thesis

Title	*Numerical Simulations of Two-phase Flow with Moving Interface using the Diffuse Interface Method*
Supervisor	Prof. Dr. Abdullah Shah

Professional Profiles

ORCID	https://orcid.org/0000-0002-7028-9837
LinkedIn	https://www.linkedin.com/in/dr-muhammad-sohaib-b85605b5
Scopus	https://www.scopus.com/authid/detail.uri?authorId=57212968086
Google Scholar	https://scholar.google.com/citations?user=gDLb-ZMAAAAJ&hl=en
Research Gate	https://www.researchgate.net/profile/Muhammad-Sohaib-31?ev=hdr_xprf

Research Metrics

Scopus	H-index: 8 — Citations: 216 — Publications: 15
Google Scholar	H-index: 9 — Citations: 255 — Publications: 17
Research Gate	H-index: 8 — Citations: 268 — Publications: 17

Research Interest

- Computational Fluid Dynamics

- Interfacial Dynamic Problems
- Two Phase Flow
- Quasi-Newton Methods
- Time-Space Fractional PDEs
- Physics Informed Machine Learning
- Data Driven Methods for Multi-Phase Flow
- AI-Driven Modeling and Scientific Computing

Work Experience

June 2016 - Till Now

Lecturer (BPS-18), *Department of Mathematics and Statistics*
Bacha Khan University, Charsadda (www.bkuc.edu.pk).

Sep 2015- Aug 2016

Lecturer, *The QIMS College Lahor*, Swabi
Lecturer in Mathematics

Aug 2013–June 2015

Graduate Assistantship, *GIK Institute*, Topi
Assisted Numerical Analysis (ES341), Differential Equations and Linear Algebra (MT201), Calculus-I (MT102), Calculus-II (MT101)

Technical Skills and Competences

Programming and Scientific Computing: C++, Matlab, Python, Fortran, Mathematica

Typesetting and Referencing: LaTeX, TeXstudio, EndNote

Data Visualization and Post-processing: Gmsh, Paraview, Tecplot

Productivity Tools: Microsoft Office Suite (Word, Excel, PowerPoint)

Published Articles

2026

- **M. Sohaib**, Z. Jan; A. Wahab; A. Shah, K.M. Furati, " Numerical investigation of the interface dynamics in a two-phase system using the space-fractional Allen-Cahn equation," Accepted, Journal: *International Journal of Differential Equations*
- I. Khan, **M. Sohaib**, T. Chinyoka; Rozli Zulkifli; R.S Lebelo; Jomana A. Bashatah, " Numerical simulation of entropy generation and heat transfer in gravity-driven tri-hybrid nano-fluid flow using finite difference methods and artificial neural networks," Accepted, Journal: *Chemical Papers*
- I. Khan, **M. Sohaib**, T. Chinyoka; Rozli Zulkifli; Sharifah E.Alhazmi; Kholod M. Abualnaja, " Numerical and artificial neural network analysis of unsteady MHD Carreau nanofluid flow over an inclined permeable surface subject to entropy generation and nonlinear thermal radiation," Accepted, Journal: *Ricerche di Matematica*
- A. Wahab, **M. Sohaib**, A. Shah, " A comparative numerical study of the Cahn-Hilliard discretizations with high-order polynomial potentials: a synthesis and benchmark computations," Published, Journal: *Journal of the Korean Society for Industrial and Applied Mathematics*
- I. Khan, Z. Ling, T. Chinyoka, **M. Sohaib**, A.A. Ibrahim, " Entropy generation in unsteady flow of a ternary nanofluid with chemical reaction, thermal radiation, magnetic field, and Darcy effects in a porous microchannel subject to convective cooling and uniform suction/injection,', DOI: https://doi.org/10.1002/zamm.70504 Journal: *ZAMM - Journal of Applied Mathematics and Mechanics* (**I.F = 3.7, Q2**)

2025

- M. Rehman, S. Mehmood, J. Sabiu, **M. Sohaib**, A. Shah, KM. Furati , "An efficient scaled DFP algorithm based on singular value analysis for solving a system of monotone nonlinear equations," DOI: 10.1002/ceat.70110, Journal: *Franklin Open*

- I. Khan, Z. Ling, T. Chinyoka, **M. Sohaib**, "Numerical study of an unsteady electro-osmotic flow of reactive third-grade fluid through a microchannel having asymmetric convective cooling," DOI: 10.1002/ceat.70110, Journal: *Chemical Engineering & Technology* (**I.F = 1.6, Q2**)
- **M. Sohaib**, A. Shah "Numerical solution of coupled Cahn-Hilliard Navier-Stokes equations for two-phase flows having variable density and viscosity," https://doi.org/10.1002/mma.9602, Journal: *Mathematical Methods in the Applied Sciences* (**I.F=2.9, Q1**)
- **M. Sohaib**, A. Shah, Khaled M. Furati, H. Khaliq "A numerical scheme for time-fractional Allen-Cahn equation with application in phase separation," https://doi.org/10.1080/00207160.2024.2420681, Journal: *International Journal of Computer Mathematics* (**I.F=1.8, Q2**)

2024

- A. Shah, M. Rehman, J. Sabiu, **M. Sohaib**, Khaled M. Furati, "A new scaled BFGS method for convex constraints monotone systems: Applications in motion control," https://doi.org/10.1016/j.rinam.2024.100531, Journal: *Results in Applied Mathematics* (**I.F=1.4, Q2**)
- **M. Sohaib**, Khaled M. Furati, A. Shah "Space fractional Allen-Cahn equation and its applications in phase separation : A numerical study," https://doi.org/10.1016/j.cnsns.2024.108173, Journal: *Communications in Nonlinear Science and Numerical Simulation* (**I.F=3.9, Q1**)

2023

- A. Shah, **M. Sohaib**, L Yuan "A numerical method for two-phase flow with its application to the Kelvin–Helmholtz instability problem," https://doi.org/10.1016/j.cnsns.2023.107334, Journal: *Communications in Nonlinear Science and Numerical Simulation* (**I.F=3.9, Q1**)
- A. Shah, S. Ayub, **M. Sohaib**, S. Saeed, S.A. Khan, S. Abbas, S.K. Shah, "An operator splitting scheme for numerical simulation of spinodal decomposition and microstructure evolution of binary alloys" https://doi.org/10.1016/j.heliyon.2023.e16597, Journal: *Heliyon* (**I.F=4, Q1**)
- M. Rehman, J. Sabiu, **M. Sohaib**, A. Shah, "A projection-based derivative free DFP approach for solving system of nonlinear convex constrained monotone equations with image restoration applications" https://doi.org/10.1007/s12190-023-01897-1, Journal: *Journal of Applied Mathematics and Computing* (**I.F=2.1, Q2**)

2022

- **M. Sohaib**, A. Shah "Fully decoupled pressure projection scheme for the numerical solution of diffuse interface model of two-phase flow," https://doi.org/10.1016/j.cnsns.2022.106547, Journal: *Communications in Nonlinear Science and Numerical Simulation* (**I.F=3.9, Q1**)

2021

- S. Haq, **M. Sohaib**, "An enhanced wavelet based method for numerical solution of high order boundary value problems," https://doi.org/10.53874/jmar.v6i0.109, Journal: *Journal of Mountain Area Research*

2020

- **M. Sohaib**, S. Haq , "An efficient wavelet based method for numerical solution of nonlinear integral and integro-differential equations" https://doi.org/10.1002/mma.6441, Journal: *Mathematical Methods in the Applied Sciences* (**I.F=2.9, Q1**)
- Attaullah,**M. Sohaib**, "Mathematical modelling and numerical simulation of HIV infection model," https://doi.org/10.1016/j.rinam.2020.100118, Journal: *Results in Applied Mathematics*, (**I.F=2, Q2**)

2019

- S. Mukhtar, **M. Sohaib**, I. Ahmad "A numerical approach to solve volume-based batch crystallization model with fines dissolution unit," https://doi.org/10.3390/pr7070453, Journal: *Processes* (**I.F=3.5, Q2**)

2018

- **M. Sohaib**, S. Haq, S. Mukhtar, Imad Khan "Numerical solution of sixth order boundary value problems using Legendre wavelet collocation method," https://doi.org/10.1016/j.rinp.2018.01.065, Journal: *Results in Physics* (**I.F=5.3, Q2**)

Invited Talks

Dec 15, 2024 *Diffuse Interface Methods for Two-Phase Flow with Moving Interfaces: Numerical Simulations*, 3rd Annual Meeting of the **Saudi Arabia InterPore Chapter** (Virtual).

Conference Presentations

Dec 7, 2021 *Second National Conference on Mathematical Sciences*, Department of Mathematics, **University of Malakand**, Pakistan.

Workshops and Training

- **Beginning Your Peer Review Journey**, March 24, 2026, organized by Springer Nature, Editorial Academy.
- **Evaluating a Manuscript and Constructing Your Review Report**, March 24, 2026, organized by Springer Nature, Editorial Academy.
- **Improving the Author Journey: Understanding Article Transfers**, March 22, 2026, organized by Springer Nature, Editorial Academy
- **MATLAB Essentials: An Indispensable Tool for Students, Young Researchers, and Engineers**, May 25, 2025, organized by MathTech Thinking Foundation, India.
- **Python Essentials for Students and Young Researchers: A Hands-on One-Day Workshop with Google Colab**, May 18, 2025, organized by MathTech Thinking Foundation, India.
- **PREE (Program Review for Effectiveness and Enhancement)**, March 18, 2025. Jointly organized by Quality Enhancement Cell, Jinnah Sindh Medical University and Sindh Higher Education Commission.
- **National Outreach Program for Faculty**, Feb 1–28, 2025. Jointly organized by HEC Pakistan and Bacha Khan University, Charsadda, Pakistan.
- **Program Review for Effectiveness, Enhancement, and Academic Research Ethics**, Jan 23, 2025. Directorate of Quality Enhancement, Bacha Khan University, Pakistan.
- **DUNE/PDELab Virtual Workshop**, Mar 8–12, 2021. Interdisciplinary Center for Scientific Computing, Heidelberg University, Germany.
- **Workshop on LaTeX: A Professional Tool for Scientific Documentation**, Mar 26, 2015. Faculty of Engineering Sciences, GIK Institute, Pakistan.
- **Two-Day Workshop on Self-Assessment Report Writing**, Mar 15–16, 2017. Quality Enhancement Cell, BKU, Pakistan.
- **HEC Workshop on Understanding Learners' Psychology and Critical Thinking**, Jan 9–11, 2018. BKU, Pakistan.
- **Progress Review and Training for Quality Enhancement Cells**, Apr 25–26, 2019. Quality Assurance Agency, HEC Islamabad, Pakistan.
- **Teachers' Training and Professional Development (Phase-I)**, Oct 10, 2019. BKUC, Pakistan.

Conferences Attended

- **Seventh International Conference on Recent Developments in Fluid Mechanics and Environmental Sciences**, Feb 13–15, 2018. Organized by QAU and IIU, Islamabad, Pakistan.
- **Second National Conference on Mathematical Sciences**, Dec 06-07, 2021. Organized by Department of Mathematics, University of Malakand, Pakistan.

Invited Departmental Presentation

- **Semester Rules and Regulation and Self-Assessment Report**, Oct 15, 2019. Quality Enhancement Cell, Bacha Khan University, Pakistan.

Online Certifications

- **Neural Networks and Deep Learning** — Jan 07, 2025
  Offered by DeepLearning.AI (via Coursera)
- **Programming for Everybody (Getting Started with Python)** — Jan 16, 2025
  Offered by University of Michigan (via Coursera)
- **Linear Algebra for Machine Learning and Data Science** — April 22, 2025
  Offered by DeepLearning.AI (via Coursera)
- **Calculus for Machine Learning and Data Science** — May 01, 2025
  Offered by DeepLearning.AI (via Coursera)
- **Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization** — June 01, 2025
  Offered by DeepLearning.AI (via Coursera)
- **Mathematics for Machine Learning: Multivariate Calculus** — July 24, 2026
  Offered by Imperial College London (via Coursera)
- **Discover the Art of Prompting** — July 10, 2026
  Offered by Google (via Coursera)

Courses Taught

Undergraduate Level

- Calculus I–III
- Ordinary Differential Equations
- Partial Differential Equations
- Integral Equations
- Complex Analysis
- Numerical Computing
- Numerical Methods
- Functional Analysis
- Real Analysis

Graduate Level

- Numerical Solution of Partial Differential Equations
- Advanced Partial Differential Equations
- Numerical Linear Algebra

Undergraduate Final Year Projects (BS Mathematics)

- **2014–2018**
  Shahzad, **Muhammad Shoaib**, **Ibrahim Khan**, **Taimoor Khan**
  Project Title: *Numerical Solution of High-Order Boundary Value Problems using Legendre Wavelet Collocation Method*
  Status: Completed

- **2015–2019**
  Muhammad Bilal, **Muhammad Kashif**, **Alam Khan**, **Wasif Ullah**
  Project Title: *A Wavelet-Based Method for the Numerical Solution of Volterra Integral and Integro-Differential Equations*
  Status: Completed

Graduate Thesis Supervision (M.Phil Mathematics)

- **Mr. Firdos Shah (2016–2018)**
  Thesis Title: *Numerical Solution of Fractional Differential Equations using Legendre Wavelet Collocation Method* **Status:** Completed

- **Mr. Zaid Jan (2023–2025)**
  Thesis Title: *Numerical Investigations of Two-phase Dynamics using Space Fractional Reaction Diffusion Equations* **Status:** Completed

- **Mr. Wahab Ali (2023–2025)**
  Thesis Title: *Spectral Methods for the Allen-Cahn Equation: Application in Phase Separation* **Status:** Completed
- **Mr. Muhammad Sadiq (2024–2026)**
  Thesis Title: *Deep Learning-Based Data-Driven Analysis of Anomalous Diffusion Phase Transition Dynamics* **Status:** In Progress
- **Mr. Muhammad Atif (2024–2026)**
  Thesis Title: *Efficient Physics-Satisfying Numerical Scheme for Simulating Phase Transition Dynamics with High Order Polynomial Potential* **Status:** In Progress

Languages Proficiencies

English Advanced *Conversationally Fluent*

Personal Interests and Social Competence

- Sports: Enjoy playing cricket regularly.
- Reading: Books, newspapers, and research-related literature.
- Community Service: Actively participate in social and voluntary activities.
- Communication: Able to work both independently and collaboratively in multicultural environments with effective interpersonal skills.
- Teamwork: Experienced in building and sustaining positive working relationships.

Organizational and Administrative Experience

- **Staff Proctor**, Department of Mathematics and Statistics, Bacha Khan University Charsadda, Pakistan (Feb. 2025 – Till date).
- **Program Coordinator**, BS Mathematics Program, Department of Mathematics and Statistics, Bacha Khan University Charsadda, Pakistan (Sep. 2016 – Jan. 2020).
- **Additional Deputy Director**, Quality Enhancement Cell (QEC), Bacha Khan University Charsadda, Pakistan (Jan. 2019 – Jan. 2020). Responsible for quality assurance and enhancement of academic programs.
- **Departmental Controller of Examinations**, Department of Mathematics and Statistics, Bacha Khan University (Feb. 2018 – Jan. 2020).
- **Member**, Board of Faculty, Bacha Khan University Charsadda (May 2018 – Jan. 2020).
- **Supervision of Students**: Supervised 12 undergraduate and 1 M.Phil student in their research projects and theses.
- **Report Writing**: Authored the Self-Assessment Report (SAR) for the Department of Mathematics and Statistics, Bacha Khan University.
- **Academic Project**: Numerical Solution of Partial Differential Equations using Finite Difference Methods (completed during MS studies).

Artistic Skills and Competences

- Proficient in handwritten Pashto, Urdu, Arabic, and English scripts.

Academic Distinctions

2008-2010 **Distinction in B.Sc. (14 Years)** from Govt College, Peshawar affiliated with University of Peshawar.

2013-2015 **Distinction in MS (18 Years)** from GIK Institute of Engineering Sciences and Technology, Pakistan.

Scholarships Awarded

2020–2024 **HEC Indigenous PhD Scholarship**, awarded by Higher Education Commission, Pakistan.

2013–2015 **MS Scholarship**, awarded by GIK Institute of Engineering Sciences and Technology, Pakistan.

Professional Memberships

- Society for Industrial and Applied Mathematics (SIAM) — Member

References

Dr. Abdullah Shah *Ph.D. Advisor*
Associate Professor, Department of Mathematics
King Fahd University of Petroleum & Minerals, KSA
Email: abdullah.shah.1@kfupm.edu.sa

Dr. Sirajul Haq *Master's Advisor*
Professor, Faculty of Engineering Sciences
GIK Institute of Engineering Sciences and Technology, Topi 23640, Pakistan
Email: siraj@giki.edu.pk