Md Fazlul Hoque, PhD

Professor, Department of Mathematics
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Research Interests

Mathematical Physics, Quantum integrable and superintegrable systems, Exactly solvable models, Quadratic and polynomial algebras, Lie algebras and representations, and Nonlinear dynamics

Education

Postdoctoral Research Fellow — **Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Czech Republic**

Supervisors: Prof. Libor Snobl — 2022 - 2023

- Awards: (i) Mobility-CTU-STA, Ministry of Education, Youth and Sports of the Czech Republic, co-financed by the European Union.
- Duration: 01 January 2022- 31 May 2023

PhD in Mathematics — **The University of Queensland, Australia**

- Supervisors: Prof. Yao-Zhong Zhang and Dr. Ian Marquette — 2014 - 2018
- Thesis: Superintegrable systems, polynomial algebra structures and exact derivations of spectra
- Awards: (i) International Postgraduate Research Scholarship (IPRS)
  (ii) Australian Postgraduate Award (APA)
  (iii) Graduate School International Travel Award (GSITA)
- PhD Awarded: 25th January 2018

M.Phil. in Mathematics — **University of Rajshahi**

- Supervisor: Prof. Dr. Dewan Muslim Ali — 2009 – 2011
- Thesis: On supra fuzzy topological spaces

M.Sc. in Mathematics — **University of Rajshahi**

- Supervisor: Prof. Dr. Akhil Chandra Paul — 2005 – 2006
- Thesis: A study on characterizations of general radical classes of rings
- Award: (i) First class first position
  (ii) Gold Medal for excellence in Mathematics

B.Sc.(Honours) in Mathematics — **University of Rajshahi**

- Award: (i) First class second position — 2001 - 2005
  (ii) Gold Medal for first class in Honours

Conducted Courses

- Algebraic Methods of Mathematical Physics
- Lie Algebras and Representations
- Quantum Mechanics
- Rings and Radicals
- Fuzzy Mathematics
- Group and Ring Theory
- Functional Analysis
- Real and Complex Analysis
- Astronomy

Work Experience

- **Professor** **Pabna University of Science and Technology, Bangladesh**
  - Dept. of Mathematics March 2021 – Present

- **Dean** **Pabna University of Science and Technology, Bangladesh**
  - Faculty of Science April 2024 – Present

- **Chairman** **Pabna University of Science and Technology, Bangladesh**
  - Dept. of Mathematics April 2024 – Present

- **Convener** **15th National Undergraduate Mathematics Olympiad, Bangladesh**
  - Rajshahi Region. 13 December 2024

- **Director** **Institutional Quality Assurance Cell (IQAC)**
  - Pabna University of Science and Technology, Bangladesh January 2022 – May 2023

- **Postdoctoral Research Fellow** **Czech Technical University in Prague, Czech Republic**
  - Faculty of Nuclear Sciences and Physical Engineering January 2022 – May 2023

- **Dean** **Pabna University of Science and Technology, Bangladesh**
  - Faculty of Science July 2019 – July 2021

- **Chairman** **Pabna University of Science and Technology, Bangladesh**
  - Dept. of Mathematics April 2020 – December 2021

- **Associate Professor** **Pabna University of Science and Technology, Bangladesh**
  - Dept. of Mathematics February 2017 – March 2012

- **General Secretary** **Pabna University of Science and Technology, Bangladesh**
  - Teachers' Association February 2018 – March 2019

- **Tutor** **The University of Queensland, Australia**
  - Calculus and Linear Algebra 2016 – 2018
  - Multivariate Calculus and Ordinary Differential Equations 2014 – 2018

- **Research Assistant** **The University of Queensland, Australia**
  - School of Economics November 2017 – April 2016

- **Visiting Researcher** — **University of Hawaii, USA**
  - Dept. of Mathematics — November 2016 – December 2016

- **Senior Research Associate** — **The University of Queensland, Australia**
  - School of Economics — November 2015 – June 2016

- **Chairman** — **Pabna University of Science and Technology, Bangladesh**
  - Dept. of Mathematics — November 2013 – April 2014

- **Assistant Professor** — **Pabna University of Science and Technology, Bangladesh**
  - Dept. of Mathematics — March 2012 – April 2014

- **Lecturer** — **Pabna University of Science and Technology, Bangladesh**
  - Dept. of Mathematics — April 2009 – March 2012

- **Lecturer** — **Lalmatia Women College, Dhaka**
  - Dept. of Mathematics — August 2008 – February 2009

- **Assistant Proctor** — **Pabna University of Science and Technology**
  - PUST — April 01, 2010 – March 31, 2014

- **Executive Member** — **Bangladesh Mathematical Society**
  - PUST — January 01, 2024 – December 31, 2025

- **Lifetime Member** — **Bangladesh Mathematical Society**

- **Member** — **Australian Mathematical Society**

- **Formal Editorial Board Member** — **Universal Journal of Computational Mathematics, USA**

- **Present** — **Pabna University of Science and Technology**
  - Blood Donors Club — June 01, 2009 – March 31, 2014

Selected Publications and pre-prints

In my research experience, I have published over 55 peer-reviewed articles, three conference proceedings and one book. These works accumulated 670 citations and my h-index is 15. For further details, please see: https://scholar.google.com/citations?user=geklu_0AAAAJ&hl=en

Some of my significant articles are:

1. Mousumi Akter, Md Sahadat Hossain, Md Fazlul Hoque, Rafiqul Islam and Md. Nasimul Karim, An Amplification of Interval-Valued Intuitionistic Fuzzy Soft Matrices for Disease Diagnosis, International J. Math. Combin. Vol.1-Vol.2 (2025), 107-119
2. Mousumi Akter, Md Sahadat Hossain, Md Fazlul Hoque, Rafiqul Islam and Md. Nasimul Karim, An extended framework for autocratic multi-parameter group decision making using interval-valued intuitionistic fuzzy numbers, Notes on Intuitionistic Fuzzy Sets, Vol.31 (2) (2025), 154–171
3. Rafiqul Islam, Md Fazlul Hoque, Mousumi Akter, Md Sahadat Hossain and Md. Nasimul Karim, α-Separation Axioms on Fuzzy Soft T0 Spaces, International J.Math. Combin. Vol.4(2024), 57-67

4. Md Fazlul Hoque, Antonella Marchesiello and Libor Snobl, Integrable systems of the ellipsoidal, paraboloidal and conical type with magnetic field, Journal of Physics A: Mathematical and Theoretical 57 (2024), 225201
5. Shekha Khatun, Md Fazlul Hoque and M. Zulfikar Ali, Spin dynamic soliton in ferromagnetic materials over the (2 +1)-dimensional beta fractional HFSC model, Results in Physics 59 (2024) 107534
6. Md Fazlul Hoque Ondrej Kubu, Antonella Marchesiello and Libor Snobl, New classes of quadratically integrable systems with velocity dependent potentials: non-subgroup type cases, The European Physical Journal Plus (EPJ Plus), 2023, 138:845
7. Mst. Shekha Khatun, Md Fazlul Hoque, M. Zulfikar Ali and Hadi rezazadeh, Abundant dynamical structure of solutions to Truncated M-fractional modified Korteweg–de Vries model: effects of dispersion, nonlinearity and fractionality, Results in Physics (2023)
8. Md Fazlul Hoque and Libor Snobl, Family of nonstandard integrable and superintegrable classical Hamiltonian systems in non-vanishing magnetic fields, Journal of Physics A: Mathematical and Theoretical 56, 165203, 2023
9. Fahad Sameer Alshammari, Md Fazlul Hoque, Harun-Or-Roshid, Muhammad Nadeem, Bifurcation analysis and bounded optical solition solutions of the Biswas-Arshed model, Computer Modeling in Engineering and Sciences,135(3), 2197-2217, 2023
10. Mohasena Ahamed and Md Fazlul Hoque, Quadratic symmetry algebras and spectrum of the 3D nondegenerate quantum superintegrable system, International J. Math. Combin. 3(2022), 1-20.
11. Fahad Sameer Alshammari, Rahmah Sulaiman Albilasi, Md Fazlul Hoque, Harun-Or-Rohsid, Overtaking collisions of m shock waves and interactions of n(n→∞)-lump, m(m→∞)-solitons, τ(τ→∞)-periodic waves solutions to a generalized (2+1)-dimensional new KdV model, Chinese Journal of Physics, 80, 385-396, 2022
12. Sabur Uddin, Shazia Khan, F S Alshammari, Harun-Or-Roshid, N. F. M. Noor, Md Fazlul Hoque, Muhammad Nadeem and Ali Akgul, Bifurcation analysis of travelling waves and multi-rogue wave solutions for a nonlinear pseudo-parabolic model of viscoelastic Kelvin-Voigt fluid, Mathematical Problems in Engineering, 8227124, 2022
13. Nondita Paul and Md Fazlul Hoque, Results on centralizers of semiprime gamma semirings, International Journal of Mathematical Combinatories, Vol. 2, 41-50, 2021
14. Mohammad Safi Ullah, M. Zulfikar Ali, Harun-Or Roshid and Md Fazlul Hoque, Collision phenomena among lump, periodic and stripe soliton solutions to a (2 + 1)-dimensional Benjamin – Bona – Mahony–Burgers Model, Eur. Phys. J. Plus (2021) 136:370
15. Francisco Correa, Md Fazlul Hoque, Ian Marquette and Yao-Zhong Zhang, N-dimensional Smorodinsky-Winternitz model and related higher rank quadratic algebra SW(N), Journal of Physics A: Theoretical and Mathematical, 54 (2021) 395201
16. Fahad Sameer Alshammari, Md Fazlul Hoque and Harun-Or-Roshid, Dynamical solitary interactions between lump waves and different forms of n-solitons (n → ∞)) for the (2+1)-dimensional shallow water wave equation, Partial Differential Equations in applied mathematics, Vol. 3, 100026, 2021.
17. Md Fazlul Hoque, Harun-Or-Roshid and Fahad Sameer Alshammari, Dynamical interactions between higher-order rogue waves and various forms of n-solitons of the (2+1)-dimensional ANNV equation, Chinese Physics B, 29, 114701, 2020
18. Rafiqual Islam, Md Sahadat Hossain and Md Fazlul Hoque, A study on intuitionistic L-fuzzy T1 spaces, Notes on Intuitionistic Fuzzy Sets, Vol. 26, 2020, No. 3, 33–42.
19. Md Fazlul Hoque, Harun-Or-Roshid and Fahad Sameer Alshammari, Higher-order rogue wave solutions of the Kadomtsev Petviashvili - Benjanim Bona Mahony (KP-BBM) model via the Hirota-bilinear approach, Physica Scripta, 95, 115215, 2020
20. Md. Fazlul Hoque and Harun-Or-Roshid, Optical soliton solutions of the Biswas-Arshed model by the expansion approach, Physica Scripta, 95, 075219, 2020, IF=2.151.

21. Mst Shekha Khatun, Md Fazlul Hoque and Md Azizur Rahman, A class of localized soliton and fractal pattern solutions of the (2+1)-dimensional modified dispersive long wave model, Physica Scripta, 2020
22. Md Fazlul Hoque and Akhil Chandra Paul, Left centralizers on Lie ideals in prime and semiprime gamma rings, International J. Math. Combin. Vol. 1. 2020, 10-19 (2020).
23. Md Fazlul Hoque, Harun-Or-Roshid and Fahad Sameer Alshammari, Higher-order rogue wave solutions of the Kadomtsev Petviashvili - Benjanim Bona Mahony (KP-BBM) model via the Hirota-bilinear approach, Physica Scripta, 2020

Conference Proceeding:

1. Md Fazlul Hoque, Ian Marquette and Yao-Zhong Zhang, On superintegrable monopole systems, Journal of Physics: Conference Series, 965, 012018 (2018).
2. Md Fazlul Hoque, Ian Marquette and Yao-Zhong Zhang, Family of N-dimensional superintegrable systems and quadratic algebra structures, Journal of Physics: Conference Series, 670, 012024 (2016).

Books:

1. Md Fazlul Hoque and D. M. Ali, Supra fuzzy topological spaces, LAP LAMBERT Academic Publishing, GmbH & Co. KG, Germany, 2012.

Selected Conferences, seminars and workshops

1. Lie algebraic applications in quantum physics, 24th International Mathematics Conference, University of Chittagong, Bangladesh, 18-19 December 2025
2. Algebraic Structures Beyond Lie Theory and Their Applications, Keynote Speaker, 1st Workshop on Algebra and its Applications 2025, Algebra Research Team of SUST, Bangladesh, 06 December 2025
3. Algebra of Symmetry: Modern Applications of Lie Groups, Lie Algebras in Mathematics and Physics, Keynote Speaker, 1st Workshop on Algebra and its Applications 2025, Algebra Research Team of SUST, Bangladesh, 06 December 2025
4. Why Lie Algebras are the Secret Engine of Modern Mathematics and Physics, Keynote Speaker, Bangladesh Mathematical Society and Department of Mathematics, PUST, Bangladesh, 01 November 2025
5. Integrable and superintegrable classical systems in magnetic fields and Poisson algebras of their integrals of motion, XLII Workshop on Geometric Methods in Physics, Bialystok, Poland, 30 June - 5 July, 2025 (Online)
6. Higher Study, Scholarship and Career Development around the Globe, Keynote Speaker, EDU VISA Expert & PUST Research Society, Pabna University of Science and Technology, Bangladesh, 10 February, 2025
7. Research and career development in Mathematics around the globe, Keynote Speaker, Jamalpur Science and Technology University, Bangladesh, 8 January, 2025
8. Symmetry algebra structures and spectrum of superintegrable systems, Invited Speaker, International Conference on Mathematics and Applications-2024, The University of Burdwan, Burdwan 713104, West Bengal, India, March 05-06, 2024
9. Algebraic approach on superintegrable monopole systems, Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University, Prague, Czech Republic, 18 April 2023
10. Nonstandard integrable and superintegrable classical systems in nonvanishing magnetic fields, 43rd Winter School Geometry and Physics, Srni, Czech Republic, 14-21 January 2023

11. Families of 3D integrable and superintegrable classical Hamiltonian systems in magnetic fields, Modern Achievements in Symmetries of Differential Equations (Symmetry 2022), Suranaree University of Technology, Nakhon Ratchasima, Thailand, 13-16 December 2022
12. A family of three-dimensional classical Hamiltonian systems in magnetic fields, XXXIV International Colloquium on Group Theoretical Methods in Physics, Strasbourg, France, 18-22 July 2022
13. Quadratic algebras and spectrum of superintegrable systems, XXXIX Workshop on Geometric Methods in Physics, Bialystok, Poland, June 19-25, 2022
14. Higher rank quadratic algebra of the N-dimensional Smorodinsky-Winternitz model, The ninth annual meeting of Australian and New Zealand Association of Mathematical Physics (ANZAMP), Australian Mathematical Society, Melbourne, Australia, February 9-11, 2022
15. Group theoretical methods in physics in memory of Pavel Winternitz, Centre De Recherches Mathematiques, University of Montreal, Canada, July 26-28, 2021
16. Lie algebras in quantum mechanics, The 21st International Mathematics Conference of Bangladesh Mathematical Society, University of Dhaka, Bangladesh, 06-08 December, 2019
17. Algebraic calculation on superintegrable monopole systems, The 85th Annual Conference of Indian Mathematical Society- An International Meet (IMS 2019), IIT, Kharagpur, India, 22-25 November, 2019.
18. Algebra structures of superintegrable monopole systems, AFMR-BMS National Mathematics Conference, University of Dhaka, Bangladesh, 21-22 December 2018.
19. On superintegrable monopole systems, The XXVth International Conference on Integrable Systems and Quantum Symmetries, Prague, Czech Republic, 6-10 June, 2017.
20. Direct and constructive approaches on *N*-dimensional superintegrable system, The Australian and New Zealand Association of Mathematical Physics, Newcastle, Australia, 10 December, 2015.
21. Family of *N*-dimensional superintegrable systems and quadratic algebra structures, The XXIIIth International Conference on Integrable Systems and Quantum Symmetries, Prague, Czech Republic, 23-27 June, 2015.
22. Quadratic algebra structure and spectrum of a new superintegrable system, 8th Australia New Zealand Mathematics Convention, Australian Mathematical Society, Melbourne, Australia, 8-12 December 2014.
23. Some separation properties of supra fuzzy topological spaces, National Seminar on Mathematics and Applications, The University of Burdwan, India, March 2012.

Technical Skills

Software: FORTRAN, C, C^{++}, MatLab, Mathematica, Maple, R, LATEX.

Supervision

I have supervised several M.Phil , M.Sc. (Thesis) and B.Sc.(Honours) project students.

- Shekha Khatun, M.Phil. Thesis title: Study on quantum superintegrable systems, higher-order polynomial algebra structures and energy spectrum (2023) (completed).
- Mohasena Ahamed, M.Sc. Thesis title: Lie algebraic applications on quantum superintegrable models (completed 2020).
- Nondita Paul, M.Sc. Thesis title: A study of centralizers and derivations on rings and gamma rings (Completed 2020).

- Shekha Khatun, M.Sc. Thesis title: Multi-soliton traveling wave solutions of nonlinear partial differential equations (Completed, 2017).
- Shelina Akter, M.Sc. Thesis title: Exact traveling wave solutions of nonlinear evolution equations in mathematical physics (Completed, 2016)

Personal Information

Father's Name:	Md Abul Hossain	Mother's Name:	Most. Samina Khatun
Spouse Name	Most. Jannatul Ferdous		
Nationality:	Bangladeshi	Marital Status:	Married
Present Address:	Dilalpur, Pabna Sadar, Pabna-6600, Bangladesh		
Mailing Address:	Department of Mathematics, Pabna University of Science and Technology, Pabna -6600, Bangladesh		
Permanent Address:	Vill: Pushcim Guriadah, P.O.: Kurshamari Thana: Lalmonirhat Sadar, District: Lalmonirhat-5500, Bangladesh		

References

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Dr. Ian Marquette
PhD Thesis associate supervisor
Department of Mathematics and Physical Sciences, La Trobe University Melbourne Victoria 3086, Australia
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Dr. Sarah Post
Associate Professor
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Tel: 808 965 7171
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University of Rajshahi, Bangladesh
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(Prof. Dr. Md Fazlul Hoque)