Dr. RAHEELA MANZOOR

Curriculum Vitae

Associate Professor, Registrar

Department of Mathematics SBK Women's University,

Brewery Road Quetta, Pakistan

Responsibilities include teaching at, under-graduate graduate and postgraduate level, curriculum development, guiding research, and Dean of Faculty of Basic Science, SBK Women's University Quetta. Doctorate and M. Phil from CIIT, Islamabad and Abbottabad respectively and Masters from University of Baluchistan Quetta. My principle research interests are numerical simulation of flow past bluff bodies, fluid-structure interactions, computational fluid dynamics using the Lattice Boltzmann Method and some other numerical techniques. Author and co-author of over 36 published, 2 accepted and four submitted research articles in foreign professional journals. Presenter in national and international conferences.

KEY QUALIFICATION AND EXPERIENCE

EDUCATION

Degree/Certificate	Institute and Location	Class/Division earned	Year of degree obtained
PhD	**CIIT, Islamabad**	**3.97 GPA with Grade A+**	**December 2016**
MPhil	CIIT, Abbottabad	3.84 GPA with Grade A+	February 2012
Master of Mathematics	UOB, Quetta	First Division with Distinction	October 2004
Bachelor of Science	UOB, Quetta	First Division	March 2002
F.S.C(equivalent to A-Level)	Girls College, Quetta	First Division	July 2000
S.S.C(equivalent to O-Level)	Lady-Sandman School, Quetta	First Division	August 1998

TEACHING

- Taught a number of undergraduate and graduate level courses at Mathematics Department, SBK Women's University, and Quetta. These include Mathematics Department, SBK Women's University, and Quetta. Taught Fluid Mechanics, Applied Statistics, Group Theory, Elasticity, Relativity Theory, Complex Analysis, Partial Differential Equation, Real Analysis, Topology, Ordinary Differential Equation, Advance PDE, Fuzzy Algebra, Lattice Boltzmann Method, Convex Analysis and Computational Fluid Dynamics to BS, MSc and M-Phil Math students (3 hrs./week, class size 40^+ students/class)

RESEARCH

- Expertise and vast experience in numerical simulation of flow past bluff bodies, fluid-structure interactions, computational fluid dynamics using the Lattice Boltzmann Method and some other numerical techniques, such as Finite Difference and Finite Element Method. This research is related to and is of interest to the MEMS (micro electro mechanical system), high rise buildings, bridges, cables, and offshore mechanics; medicines, cleaning drinking water but other components of the research are longer-term, fundamental investigations, with no immediate industrial motivation. In terms of practical applications, this research is related to building aerodynamics, wind-turbine, piping, high rise buildings and so on. Furthermore, to developed new numerical techniques such as Finite Difference-Lattice Boltzmann Method (FD-LBM) and Finite Element-Lattice Boltzmann Method (FE-LBM) for above mentioned fields.

SPECIALIZATION

- Specialization in Fuzzy Algebra, Computational Fluid Dynamics & Lattice Boltzmann Method, Advance Numerical Analysis. Lattice Boltzmann Method.

ADMINISTRATION

- Actively involved in administrative responsibilities such as,
- Headship from March 2012- October 2013 and August 2016 – April 2019.
- Dean of Basic Science Faculty from April 2019-up to May 2022.
- Acting Registrar of SBKWU, Quetta from 22 December 2021 till December 2023.\
- Acting Registrar of SBKWU, Quetta from 2nd December 2023 till 20th December.\
- Acting Registrar of SBKWU, Quetta from 23rd August 2024 till now.

AWARDS

2013-2016 (For PhD study)	Indigenous Scholarship CIIT, Islamabad
2012 (Based on published papers in 2011-2012)	Research Productivity Award (SBK Women's University, Quetta)
2010-2012 (For MPhil study)	Scholarship CIIT, Abbottabad
Best Teacher Award (2017)	Govt of Baluchistan
Best Teacher Award (2017)	SBK Women's University, Quetta
Professor Award (2019)	Mahnoor-Trsut, Baluchistan
Best Women's Award as a teacher in Govt of Baluchistan	PPF, Islamabad
Best Teacher Award (2023)	Govt of Baluchistan

MEMBERSHIP

Head of Department of Mathematics	(From 2012-2013 and (2016-2019) SBK Women's University, Quetta
Dean of Basic Sciences	April 2019 till May 2022
Acting Registrar of SBKWU, Quetta	22nd December 2021 06 December 2022
Acting Registrar of SBKWU, Quetta	02nd December 2023 till 18 December 2023
Acting Registrar of SBKWU, Quetta	23rd August 2024 till now
Member of Board of Studies of Basic Sciences	March 2004 till continue SBK Women's University, Quetta
Member of M. Phil Supervisory Committee	March 2013 till continue SBK Women's University, Quetta
Membership of Ph. D Supervisory Committee	April 2017-2020, SBK Women's University, Quetta
Member of Advisory Committee	March 2004 till continue, SBK Women's University, Quetta
Member GRMS & ASRB	October 2021 till now
Member of Departmental Research Committee of Basic Sciences	March 2013 till continue, SBK Women's University, Quetta
Member of Departmental Research Committee of Mathematics Department	March 2016 till continue, BUITEMS University Quetta
Member as External Examiner of MPhil Exam	BUITEMS and UOB, Quetta
Member as Internal Examiner of Ph.D. Comprehensive Exam	April 2017 till continue, SBK Women's University, Quetta

Member as Internal Examiner of Ph.D. Exam	April 2024, AIR University Islamabad
Member of Senate	March 2017-2020, SBK Women's University, Quetta
Member of Academic Council	March 2019 till continue, SBK Women's University, Quetta
Member of Board of Advance Studies and Research	March 2019 till continue, SBK Women's University, Quetta
Member of Master Trainer Faculty Development Program	June 2006 till now, HEC, Islamabad
Member of Endowment Fund Committee	April 2017-2020, SBK Women's University, Quetta
Member of HEC Curriculum development Committee	March 2017 till now, SBK Women's University, Quetta
Member of Board of SBK Model School	March 2018 till continue, SBK Women's University, Quetta
Member of Harassment Committee developed for Women	March 2017-2020, SBK Women's University, Quetta
Member of Ph.D. Supervisory Committee	March 2019 till now, HEC Islamabad

PERSONAL DATA

- ➢ **N.I.C #** : 54400-4876999-6
- ➢ **Marital Status** : Married
- ➢ **Religion** : Islam
- ➢ **Nationality** : Pakistani
- ➢ **Local** : Local Pishin
- ➢ **Domicile** : Quetta
- ➢ **Postal Address** : Associate Professor, Mathematics Department, SBK Women's University, Brewery Road Quetta, Pakistan
- ➢ **Tel (off)** : 0819213309
- ➢ **Mobile** : +923363808179
- ➢ **Email** : raheela_manzoor@yahoo.com

COMPUTER SKILL

Microsoft Word, Microsoft Excel. Well versed with statistical software, Mathematical packages such as MATLAB, MATHEMATICS, FOTRON, TECPLOT etc.

LIST OF PUBLICATION

1. Islam, S. U., Manzoor, R., Islam, Z. U., Kalsoom, S., & Ying, Z. C. (2017). A computational study of drag reduction and vortex shedding suppression of flow past a square cylinder in the presence of small control cylinders. *AIP Advances, 7*(4), 045119. https://doi.org/10.1063/1.4985964

2. Islam, S. U., Manzoor, R., & Tareen, A. (2017). Numerical investigation of flow around a square cylinder with an upstream control plate at low Reynolds numbers in tandem. *Journal of the Brazilian Society of Mechanical Sciences and Engineering, 39*, 1201–1223. https://doi.org/10.1007/s40430-017-0841-6

3. Manzoor, R., Islam, S. U., Abbasi, W. S., & Parveen, S. (2016). Variation of wake patterns and force coefficients of the flow past square bodies aligned inline. *Journal of Mechanical Science and Technology, 30*(4), 1691–1704. https://doi.org/10.1007/s12206-016-0347-3

4. Islam, S. U., Manzoor, R., & Ying, Z. C. (2017). Effect of Reynolds numbers on flow past a square cylinder in the presence of multiple control cylinders at various gap spacing. *Arabian Journal for Science and Engineering, 42*(3), 1049–1064. https://doi.org/10.1007/s13369-017-2560-2

5. Islam, S. U., Manzoor, R., Ying, Z. C., Rashidi, M. M., & Khan, A. (2017). Numerical investigation of fluid flow past a square cylinder using upstream, downstream, and dual splitter plates. *Journal of Mechanical Science and Technology, 31*(2), 669–687. https://doi.org/10.1007/s12206-016-1205-2

6. Islam, S. U., Manzoor, R., & Ying, Z. C. (2015). Effect of Reynolds number on flow past a square cylinder in the presence of upstream and downstream flat plates at small gap spacing. *International Journal of Mechanical Aerospace, Industrial, and Manufacturing Engineering, 9*(12), 1424–1429.

7. Ahmed, N., Khan, A., Manzoor, R., & Mohyud-Din, S. T. (2017). Influence of viscous dissipation on a copper oxide nano fluid in an oblique channel: Implementation of the KKL model. *European Physical Journal Plus, 132*, 237. https://doi.org/10.1140/epjp/i2017-11482-0

8. Islam, S. U., Manzoor, R., Khan, U., Nazeer, G., & Hassan, S. (2018). Drag reduction on a square cylinder using multiple detached control cylinders. *KSCE Journal of Civil Engineering, 22*(5), 2023–2034. https://doi.org/10.1007/s12205-018-0127-3

9. Islam, S. U., Manzoor, R., Mengal, T., Naeem, A., Parveen, S., & Akbar, R. (2017). Numerical study of drag reduction for flow past a square cylinder through passive control method at various gap spacing. *Journal of Computational and Theoretical Nanoscience, 14*(12), 5872–5880. https://doi.org/10.1166/jctn.2017.7180

10. Asadullah, M., Khan, U., Ahmed, N., Manzoor, R., & Mohiyud-Din, S. T. (2013). MHD flow of a Jeffery fluid in converging and diverging channels. *International Journal of Modern Mathematics and Sciences, 6*(2), 92–106.

11. Kalsoom, S., Manzoor, R., & Khan, A. (2013). Note on (α, μ)-fuzzy interior ideals of Hemirings. *International Journal of Algebra and Statistics, 2*(2), 1–9.

12. Yousafzai, F., Yaqoob, N., Haq, S., & Manzoor, R. (2012). A note on intuitionistic fuzzy G-LA-semi groups. *World Applied Sciences Journal, 19*(12), 1710–1720.

13. Manzoor, R., Khan, A., Yousafzai, F., & Amjad, V. (2013). Fuzzy quasi-ideals with thresholds (α; β] in ordered semigroups. *International Journal of Algebra and Statistics, 2*(1), 72–82.

14. Khan, A., & Manzoor, R. (2012). Generalized fuzzy quasi-ideals in ordered semi-groups. *International Journal of Algebra and Statistics, 1*(2), 33–45.

15. Islam, S. U., Nazeer, G., Ying, Z. C., & Manzoor, R. (2017). Transitions in the flow patterns and aerodynamic characteristics of the flow around staggered rows of cylinders. *PLOS ONE, 12*(10), e018416. https://doi.org/10.1371/journal.pone.018416

16. Bibi, T., Ahmad, R. M., Baloch, I. A., Manzoor, R., & Muhammad, S. (2017). Ethnomedicinal uses of plants for childbirth and postpartum recovery in district Pishin, northern Balochistan, Pakistan. *International Journal of Biological and Pharmaceutical Allied Sciences, 6*(9), 1730–1760.

17. Islam, S. U., Manzoor, R., Ying, Z. C., & Islam, Z. U. (2018). Numerical investigation of different aspect ratios for flow past three inline rectangular cylinders. *Journal of the Brazilian Society of Mechanical Sciences and Engineering, 40*, 410. https://doi.org/10.1007/s40430-018-1261-5

18. Abbasi, W. S., Islam, S. U., Rahman, H., & Manzoor, R. (2018). Numerical investigation of fluid-solid interaction for flow around three square cylinders. *AIP Advances, 8*(2), 025221. https://doi.org/10.1063/1.5023871

19. Manzoor, R., Islam, S. U., Batool, S., Anwar, A., & Akhtar, P. (2018). Numerical analysis of wake mode and force statistics for flow over two rectangular rods at different Reynolds numbers. *International Journal of Emerging Engineering Research and Technology, 6*(10), 2349–4409.

20. Ghaffar, A., Iqbal, M., Bari, M., Muhammad, S., Manzoor, R., Sooppy, K., & Baleanu, D. (2019). Construction and application of nine-Tic B-spline tensor product SS. *Mathematics, 7*, 675. https://doi.org/10.3390/math7070675.

21. Islam, S. U., Manzoor, R., Zahid, M., Kulsoom, S., & Kausar, U. (2019). Numerical study of flow past three rectangular rods at unequal gap spacing. *Indian Journal of Science and Technology, 12*(32). https://doi.org/10.17485/ijst/2019/v12i32/141066.

22. Manzoor, R., Ghaffar, A., Baleanu, D., & Nisar, K. S. (2019). Numerical analysis of fluid forces for flow past a square rod with detached dual control rods at various gap spacing. *Symmetry, 12*, 159. https://doi.org/10.3390/sym12010159.

23. Ahmed, A., Manzoor, R., Islam, S. U., & Rahman, H. (2019). Numerical investigation for flow past over a square rod through passive control method at various Reynolds number. *Canadian Journal of Physics, 98*(5), 1–10. https://doi.org/10.1139/cjp-2018-0375.

24. Khalid, A., Younas, S., Manzoor, R., Khan, I., & Nawaz, R. (2019). Mode matching analysis for two-dimensional acoustic wave propagation in trifurcated lined duct. *Journal of Interdisciplinary Mathematics, 22*, 1095–1112.

25. Ahmed, A., Islam, S. U., Ying, Z. U., & Manzoor, R. (2019). Fluid dynamics around three cylinders in the presence of small control cylinders. *Canadian Journal of Physics, 98*(4), 1–9.

26. Manzoor, R., Khalid, A., Khan, I., & Islam, S. U. (2020). Numerical simulation of drag reduction on a square rod detached with two control rods at various gap spacing via lattice Boltzmann method. *Symmetry, 12*(475). https://doi.org/10.3390/sym12030475.

27. Manzoor, R., Anwar, A., Islam, S. U., & Jamil, K. (2021.). Transition of flow past a square rod through passive control method at low Reynolds number. *International Journal of Emerging Engineering Research and Technology, 8*(6), 32–43.

28. Rahman, H., Islam, S. U., Ali, I., Khan, M. U., Abbasi, W. S., & Manzoor, R. (2021). Lattice Boltzmann analysis of fluid-structure interaction mechanism around a row of five side-by-side square cylinders. *Ocean Engineering, 238*, 109738. https://doi.org/10.1016/j.oceaneng.2021.109738.

29. Ahmad, A., Wahid, A., Manzoor, R., Nadeem, N., Ullah, N., & Muhammad, S. (2021). Flow characteristics and fluid force reduction of flow past two tandem cylinders in presence of attached splitter plate. *Mathematical Problems in Engineering, 2021*, Article ID 4305731. https://doi.org/10.1155/2021/4305731

30. Manzoor, R., Islam, S. U., Nadeem, N., Perveen, S., & Naeem, T. (2021). Numerical investigations for flow past two square rods in staggered arrangement through lattice Boltzmann method. *Annals of Mathematics and Physics, 4*(1), 16–27. https://doi.org/10.17352/amp.000021.

31. Rahman, H., Islam, S. U., Abbasi, W. S., Manzoor, R., Ameen, F., & Alam, Z. (2021). Numerical computations for flow patterns and force statistics of three rectangular cylinders. *Mathematical Problems in Engineering, 2021*, Article ID 9991132. https://doi.org/10.1155/2021/9991132.

32. Manzoor, R., Jalil, M., & Naz, T. (2021). Vortex suppression and drag reduction through passive control method at various Reynolds numbers. *SBK Journal of Basic Science & Innovative Research, 1*(1), 12–33.

33. Wen Yao, S., Manzoor, R., Zafar, A., In, M., Abbagari, S., & Houwe, A. (2022). Exact soliton solutions to the Cahn–Allen equation and Predator–Prey model with truncated M fractional derivative. *Results in Physics, 37*, 105455. https://doi.org/10.1016/j.rinp.2022.105455

34. Adnan, U., Khan, N., Ahmed, R., Manzoor, R., & Mohyud-Din, S. T. (2021). Impacts of various shaped Cu-nanomaterial on the heat transfer over a bilateral stretchable surface: Numerical investigation. *Advances in Mechanical Engineering, 13*(12), 1–10. https://doi.org/10.1177/16878140211039147.

35. Manzoor, R., Mushtaq, S., Nadeem, N., Perveen, S., Kalsoom, S., Naeem, A., & Akbar, R. (2023). Numerical investigation of flow past a triangular cylinder at various Reynolds numbers. *Physics of Fluids*.

36. Manzoor, R., Kalsoom, S., Naeem, A., Nadeem, N., & Aziz, G. (2023). Numerical analysis of flow past over square rods using control rod at distinct gap spacing. *International Journal of Innovative Science and Technology*. 5(4),

37. Manzoor, R., Habib, B., Kalsoom, S., Jamil, N., & Haque, M. (2023). Numerical simulation of flow past a square object detached with controlling), object at various Reynolds numbers. *International Journal of Innovative Science and Technology*. 6(2), 491-513.

38. Manzoor, R., Islam, S. U., Jalil, M., & Akhtar, Y. (2024). Fluid structure interaction problem for flow past three unequal sized square cylinders at different Reynolds numbers. *Physics of Fluids, 36*(4). https://doi.org/10.1063/5.0034175.

39. Manzoor, R., Habib, R., Nadeem, N., & Kalsoom, S. (2024). Numerical analysis of flow past over a triangular rod through passive control method. *Physics of Fluids, 36*, 034103. https://doi.org/10.1063/5.0033700

40. Saleem, E. U., Manzoor, R., Azhar, N., Saleem, E.limeter wave communication applications. *International Journal of Innovative Science and Technology*. 6(2), 725-738.

41. Kalsoom, S., Abbasi, W. S., & Manzoor, R. (2024). Numerical study of flow past two square cylinders with horizontal detached control rod through passive control method. *AIP Advances, 14*(6), 065009. https://doi.org/10.1063/5.0042739.

42. Kalsoom, S., Abbasi, W. S., & Manzoor, R. (2024). Numerical simulation of wake flow around two square cylinders through passive control method. *Physics of Fluids, 36 (8)* 0341032,http://doi.org 10.1063/5.0220959

43. Manzoor, R., Ahmad, Z., Ali, I., & Aslam, F. (2024). A two-dimensional instability in mixed convection with spatially periodic lower wall heating by LBM method. *Kurdish Studies, 12*(5), 1123–1129.

44. Ahmad, A., Manzoor, R., Ali, I., Kalsoom, S., Azhar, N., Jamil, N., Javid, I., & Behlil, F. (2024). Numerical study of flow behind the rods in side-by-side arrangement through lattice Boltzmann method. *Kurdish Studies, 12*(5), 897–915.

45. Jamil, N., Anum, H., Manzoor, R., Urooj, R., Behlil, F., Ashrah, S., Balgulzai, B. A., & Sheikh, N. (2024). Irrigation system to decrease carbon footprint and increase yield of Citrullus lanatus. *Kurdish Studies, 12*(5), 1–5.

46. Islam, S. U., Manzoor, R., Ahmad, Z., Kalsoom, S., & Kausar, A. (2024). Analysing the effect of unequal gap spacing for flow past over three rectangular rods at fixed Reynolds number (Re) and aspect ratio (AR). **Book;** *Mathematics and Computer Science - Contemporary Developments, 2*, 18–44. B P International.

47. Kalsoom, S., Abbasi, W. S., Manzoor, R., Aslam, F., & Azhar, N. (2024). Numerical simulation of flow characteristics over two square cylinders at different diameters with various gap spacing. *Kurdish Studies, 12*(5), 1481–1500.

48. Bunpheng, W., Manzoor, R., Panezai, N., Haque, M., Shah, H. H., Heili, M., Rao, J. S., & Kit, C. C. (2024). Numerical simulations for flow past five inline square rods at various gap spacing. *Kurdish Studies*.

49. Azhar, N., Anum, L., Manzoor, R., Akhter, Y., & Khan, O. (2024). Assessment of wind power and energy at the coast of Balochistan, Pakistan. *Remittances Review, 9*(54), 501–516.

50. Sheikh, N., Naeem, A., Parveen, S., Rahman, A., Anjum, M., Yaseen, M., & Manzoor, R. (2024). Prediction of cardiovascular diseases through machine learning algorithms: A supervised model. *Kurdish Studies, 12*(5), 818–828.

51. Azhar, N., Manzoor, R., & Kalsoom, S. (2024) Application of fractional integral transform in fuzzy differential equations. **(book) In** *Fractional Calculus - From Theory to Applications*. IntechOpen.

52. Manzoor, R., Kalsoom, S., Kalsoom, T., Panezai, F., Panezai, N., & Sheikh, N. (2024). Transition of flow past five square obstacles in tandem arrangement at distinct gap spacing. *Kurdish Studies*.

53. Rahman, H., Abbasi, W.S., N, Sumera., Manzoor, R. (2024) Effect of Dual Connected Vertial Plates on Flow Features of Single Square Cylinder. Computational Particle Mechanics. Accepted.

SUPERVISION AND CO-SUPERVISION OF MS THESIS

CO-SUPERVISION OF STUDENTS (M.PHIL)

i)Tehmina Naeem, ii) Hina Gul, iii) Shahida Batool, iv) Sadia Arshad, v) Azeema Ali, vi) Alia, vii) Asia Gul and viii) Zahid Ahmad.

CO-SUPERVISION OF STUDENTS (P.HD)

Shazia Kalsoom (AIR University, Islamabad)

SUPERVISION OF STUDENTS (M.PHIL)

i)Anila Anwar, **ii**) Amara Kausar, **iii**) Madiha Khan, **iv**) Zarpana Khan, **v**) Asia Rahman, **vi**) Perveen Akhtar, **vii**) Khursheed Jamil, **viii**) Malala Khan, **ix**) Gohar Azia, **x**) Rukhsana, **xi**) Neelam Khan **xii**) Maliha Jalil and **xiii**) Tehmina Naz, **xiv**) Saman Mushtaq, **xv**) Rida Habib, **xvi**) Bushra Habib, **xvii**) Komal Khan, **xviii**) and Saiqa Kakar.

PROFESSIONAL TRAININGS, COURSES, WORKSHOPS AND SEMINARS

1. Attended a conference on "Gravitational Collapse" held at the University of Punjab in 2011.

2. Worked as an organizer for the "SYMPOSIUM" held at CIIT Abbottabad in 2011.

3. Attended the 7th "Faculty Development Program" workshop for three months through HEC, held in Islamabad in 2006.

4. Attended the "3rd Master Trainers Faculty Development Program" workshop through HEC in 2010.

5. Attended a three-day workshop on "Digital Library" through HEC, held at SBK University Quetta in 2009.

6. Attended a symposium on "Computational Complexities, Innovations, and Solutions" held at CIIT Abbottabad in 2014.\

7. Attended the "Staff Development Course under the Scheme National Academy of Higher Education" at BUITEMS, Quetta in 2012.

8. Achieved an "International Computer Driving License" by attending a three-month training course through HEC in Islamabad in 2006.

9. Attended a three-day "Research Methodology Workshop" for physical sciences conducted by the QEC department at SBK Women's University Quetta in 2012.

10. Participated in the "Flower Exhibition" at the University of Balochistan in 2003.

11. Attended a one-week workshop on "Advanced Mathematics" held at the University of Balochistan through HEC in 2004.

12. Attended a three-day workshop on "Revamping the Integrated Undergraduate Curriculum" at BUITEMS, Quetta in May 2019.

13. Attended a four-day workshop on "Ph.D. Supervision" at BUITEMS, Quetta in April 2019.

14. Attended a three-day workshop on "Harassment of Women" at Serena Hotel in November 2019.

15. Attended one week workshop OF SAP (ERP) in Islamabad through HEC as a Registrar.

16. Delivered two session as a resource person about strategic planning in HEC Faculty Development Program conducted in SBKWU, Quetta.

END