**Muhammad Rafiq**

CURRENT ADDRESS

Assistant Professor, Department of Mathematics,

COMSATS Institute of information Technology,

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**OBJECTIVE**

My aim is to enhance my thinking approach and vision by working in an organization, which can prove to be a launching pad for me in the way of discovering knowledgeable and skillful paths. Being of my carrier, I am looking for long-term relation with the organization.

**AREA OF INTEREST**

Numerical Analysis, Numerical and Analytical Solution of Ordinary and Partial Differential Equations, Graph Theory, Mathematical Modeling of Electrical Discharge Phenomena, Calculus.

**EDUCATION**

**PhD Mathematics**

COMSATS Institute of Information technology Islamabad, Pakistan

CGPA: 3.32 out of 4. 0. (2008-2012)

**Subjects Studied in PhD**

Advanced Modern Algebra with Applications, Advanced Convex Analysis, Numerical Methods for Variational Inequalities, Topics in Numerical Mathematics, Hilbert Space Methods, and Numerical Solutions of ODEs.

**PhD Thesis (Numerical Methods for Solving Obstacle Problems)**

It is well known that a wide class of obstacle and unilateral problems can be studied in the unified framework of variational inequalities. Using the penalty function method, the variational inequalities are characterized by a system of boundary value problems in conjunction with the known obstacle. We use the variational iteration method for solving the system of boundary value problems associated with the obstacle problems. Several examples of second, third, fourth and fifth-orders system of boundary value problems are given to illustrate the efficiency and implementation of the variational iteration method. Comparison with the homotopy perturbation technique demonstrates that the variational iteration technique performs better.

**M.S Engineering sciences (Computational Mathematics)**

Ghulam Ishaq Khan Institute of Engineering Sciences and Technology Topi, NWFP, Pakistan, CGPA: 3.47 out of 4.0. (2002-2004)

**Subjects Studied in MS**

Linear System Theory, Advanced Experimental Techniques, Computational Methods for Engineers, Analytical Mechanics, Graph Theory, Numerical Methods for Partial Differential Equations, Numerical Functional Analysis, Mathematical Modeling of Electrical Discharge Phenomena.

**Ms Thesis (Numerical Solution of Wave Equation using Splitting Techniques**)

Alternating Direction Implicit Methods are developed for some known schemes. These methods are used to solve two dimensional simple wave equation problem with initial and boundary conditions specified. These methods are tested on a problem from the literature. The results obtained were better than those of other methods in the literature. Numerical experiments verify that the developed methods perform very well for the wave equation in two- space dimension.

**M.S Semester Projects**

Case study in Semi-Conductor devices. Study of Controllable and observable system in automatic Control System. Graphical Implementation of mathematical expression, binary Trees.

**Msc Mathematics**

Quaid-e- Azam University Islamabad, Pakistan.

Marks: 64.1% (1999- 2002).

**Subjects Studied in M.Sc.**

Advanced Calculus, Linear Algebra, Differential Geometry, Set Topology, Ordinary Differential Equations, Real Analysis, Group Theory, Complex Analysis, Analytical Mechanics, Numerical Analysis, Functional Analysis, Partial Differential Equations, Fluid Mechanics, Analytical Dynamics, Mathematical Statistics, Integral Equations, Special Relativity, Electromagnetism.

**BSc (Mathematics A, B & Physics)**

Govt College Sahiwal (Bahauddin Zakria University Multan)

Marks: 74.99% (1997- 1999)

**Fsc Pre Engineering**

Govt Friedia College Pak Pattan, Punjab, Pakistan.

Marks: 58.27% (1993- 1995)

**SSC Science**

Govt High School Chak Bedi, Pak Pattan, Punjab, Pakistan.

Marks: 72.11% (1991- 1993)

**RESEARCH PUBLICATIONS**

1. M. A. Noor, K. I. Noor, **M. Rafiq** and E. A. Al-Said. Variational Iteration Method for Solving a System of Second-Order Boundary Value Problems, International Journal of Nonlinear Sciences & Numerical Simulation 11(12): 1109-1120. ISI-Journal, 2010. **IF=3.1.**
2. M. A. Noor, **M. Rafiq,** K. I. Noor, E. A. Al-Said and A. K. Khalifa. Solving System of Fourth-order Boundary Value Problems by Variational Iteration Method. World Applied Sciences Journal 13(11): 2312: 2322. ISI-Journal, (Zoological), 2011.
3. M. A. Noor, K. I. Noor**, M. Rafiq,** E. A. Al-Said and J. Coletsos. Homotopy Perturbation method for solving a system of third-order boundary value problems. International Journal of the Physical Sciences, 6(16), 4128-4133. 2011. IF=0.540 till 2010.
4. S.T.Mohyud-Din, Hassan Khan, Muhammad Arif, **M. Rafiq**, Chebyshev wavelet method to nonlinear fractional Volterra–Fredholm integro-differential equations with mixed boundary conditions. Advances in Mechanical Engineering, 9(2) 1–8, 2017, **IF= 0.848**
5. Muhammad Asad Iqbal, Muhammad Shakeel, Syed Tauseef Mohyud-Din and **Muhammad Rafiq**, Modified wavelets–based algorithm for nonlinear delay differential equations of fractional order, Advances in Mechanical Engineering, 9(3) 1–8. 2017, **IF= 0.848.**
6. [Y. Bashir](http://www.mdpi.com/search?authors=Yasir%20Bashir&orcid=),[A. Aslam](http://www.mdpi.com/search?authors=Adnan%20Aslam&orcid=),[M. Kamran](http://www.mdpi.com/search?authors=Muhammad%20Kamran&orcid=), [M. I. Qureshi](http://www.mdpi.com/search?authors=Muhammad%20Imran%20Qureshi&orcid=), [A. Jahangir](http://www.mdpi.com/search?authors=Adnan%20Jahangir&orcid=), [**M. Rafiq**](http://www.mdpi.com/search?authors=Muhammad%20Rafiq&orcid=), [N. Bibi](http://www.mdpi.com/search?authors=Nargis%20Bibi&orcid=0000-0002-3408-2513) and [N. Muhammad](http://www.mdpi.com/search?authors=Nazeer%20Muhammad&orcid=0000-0002-4056-9854), On Forgotten Topological Indices of Some Dendrimers Structure, Molecules 2017, 22(6), 867, doi:[10.3390/ molecules 22060867](http://dx.doi.org/10.3390/molecules22060867), 2017, **IF= 3.098.**
7. A. **Aslam, Y. Bashir, M. Rafiq, F. Haider, N. Muhammad, N. Bibi,** [Three New/Old Vertex-Degree-Based Topological Indices of Some Dendrimers Structure, Electronic Journal of Biology, 13(1): 94-99, 2017, IF=0,](http://ejbio.imedpub.com/three-newold-vertexdegreebased-topological-indices-ofsome-dendrimers-structure.php?aid=18762" \o "Three New/Old Vertex-Degree-Based Topological Indices of Some Dendrimers Structure) **[ISI Journal.](http://ejbio.imedpub.com/three-newold-vertexdegreebased-topological-indices-ofsome-dendrimers-structure.php?aid=18762" \o "Three New/Old Vertex-Degree-Based Topological Indices of Some Dendrimers Structure)**
8. **[M. Rafiq](http://ejbio.imedpub.com/three-newold-vertexdegreebased-topological-indices-ofsome-dendrimers-structure.php?aid=18762" \o "Three New/Old Vertex-Degree-Based Topological Indices of Some Dendrimers Structure)** [, H. Ahmad, S. T. Mohyud-Din, Variational iteration method with an auxiliary parameter for solving Volterra’s population model, Nonlinear Sci. Lett. A, 8, (4), 389-396.](http://ejbio.imedpub.com/three-newold-vertexdegreebased-topological-indices-ofsome-dendrimers-structure.php?aid=18762" \o "Three New/Old Vertex-Degree-Based Topological Indices of Some Dendrimers Structure) 2017, IF=0, Non ISI
9. S. Mahmood, S. Farwa, **M. Rafiq,** S. Muhammad, J. Riaz, T. Shah, S. S. Jamal, [To study the effect of the generating polynomial on the quality of non-linear components in block ciphers](http://downloads.hindawi.com/journals/scn/aip/5823230.pdf), Security and Communication Networks, Article ID=5823230, 8 pages, 2018, **IF=1.067.**
10. [M. Usman](https://aip.scitation.org/author/Usman%2C+Muhammad), [K. Saba](https://aip.scitation.org/author/Saba%2C+Kiran), [D. Han](https://aip.scitation.org/author/Han%2C+Dong-Pyo), [N. Muhammad](https://aip.scitation.org/author/Muhammad%2C+Nazeer), [S. Farwa](https://aip.scitation.org/author/Farwa%2C+Shabieh),  [**M.**](https://aip.scitation.org/author/Muhammad%2C+Rafique) **Rafiq** and [T. Saba](https://aip.scitation.org/author/Saba%2C+Tanzila), Degradation effect of Auger recombination and built-in polarization field on GaN-based light-emitting diodes,  [AIP Advances](https://aip.scitation.org/journal/adv), 8(1),015005 (2018);  <https://doi.org/10.1063/1.5010241>,2018, **IF=1.568.**
11. S T Mohyud Din, T Zubair , M Usman, M Hamid, **M Rafiq** and S Mohsin, Investigation of Heat and Mass Transfer under the Influence of Variable Diffusion Coefficient and Thermal Conductivity, Indian Journal of Physics, 92(9), 1109–1117, 2018. **IF= 0.988.**
12. Muhammad Usman, Urooj Mushtaq, Dong-Guang Zheng, Dong-Pyo Han, **Muhammad Rafiq** and Nazeer Muhammad, Enhanced Internal Quantum Efficiency of Bandgap-Engineered Green W-Shaped Quantum Well Light-Emitting Diode, Applied Sciences, 9(1), Article No.77, 2018, **IF=1.689.**
13. [Fitnat Saba](https://www.mdpi.com/search?authors=Fitnat%20Saba&orcid=), [Naveed Ahmed](https://www.mdpi.com/search?authors=Naveed%20Ahmed&orcid=), [Umar Khan](https://www.mdpi.com/search?authors=Umar%20Khan&orcid=) ,[Asif Waheed](https://www.mdpi.com/search?authors=Asif%20Waheed&orcid=), [**Muhammad Rafiq**](https://www.mdpi.com/search?authors=Muhammad%20Rafiq&orcid=) and[Syed Tauseef Mohyud-Din](https://www.mdpi.com/search?authors=Syed%20Tauseef%20Mohyud-Din&orcid=), Thermophysical Analysis of Water Based (Cu–Al2O3) Hybrid Nanofluid in an Asymmetric Channel with Dilating/Squeezing Walls Considering Different Shapes of Nanoparticles, Applied Sciences, 8(9), Article No. 1549; 2018. **IF=1.689**
14. S.A. Haider, S. R. Naqvi, Aamir Sardar, **M. Rafiq Sial** , S. Khaliq, M. Kamran, LSTM neural network based forecasting model for wheat production in Pakistan, Agronomy, 9(2), Article No.72, 2019**. IF= 1.419.**
15. Umar Khan; Sadaf Bibi; Naveed Ahmed; Imran Faisal; **Muhammad Rafiq**, Some new solutions of the Caudrey–Dodd–Gibbon (CDG) equation using the Atangana- Baleanu conformable derivative, Advances in Difference Equations. Article No. **2019**:89, 2019, **IF=1.066.**
16. **M. Rafiq**, S. Arifa1, B. Singh, M. Nazeer , S. Arif, M. Bibi, M. Usman, A. Jahangir, Harmonic waves solution in dual-phase-lag magnetothermo elasticity  
    Open Physics, 17(1), 2019, <https://doi.org/10.1515/phys-2019-0002>, . **IF=0.755**.
17. **M. Rafiq**, S. Ashrafb, S. A. Abdullah and T. Mahmood, The Cosine Similarity Measures of Spherical Fuzzy Sets and Their Applications in Decision Making, Journal of intelligent and fuzzy system, Accepted, <https://www.researchgate.net/publication/332632479_The_cosine_similarity_measures_of_spherical_fuzzy_sets_and_their_applications_in_decision_making>. **IF= 1.426**.
18. Waqar Mahmood , Saif Ullah Awan, Amad Ud Din, Junaid Ali, Muhammad   
    Farooq Nasir, Nazakat Ali, Anwar ul Haq, Muhammad Kamran, Bushra Parveen, **Muhammad Rafiq**, Nazar Abbas Shah, Pronounced impact of p-type carriers and reduction of bandgap in semiconducting ZnTe thin films by Cu doping for intermediate buffer layer in heterojunction solar cells, Materials **2019**, 12(8), 1359;  <https://doi.org/10.3390/ma12081359>. **IF= 2.467.**
19. **Muhammad Rafiq**, Muhammad Kamran, Naveed Ahmed, syed Tauseef mohyud-din, Yasir Bashir, Sajjad Ali Haider, Shabieh Farwa, Madeeha Tahir, Analytical solution for the flow of second grade fluid over a stretching sheet . AIP Advances 9, 055313 (2019). **IF= 1.653.**
20. **Muhammad Rafiq,** Muhammad Aslam Noor , Madeeha Tahir, Muhammad Kamran, Muhammad Amer Qureshi , and Shabieh Farwa, Efficient analytical approach to solve system of BVPs associated with fractional obstacle problem, AIP Advances 9(9), 095007 (2019). **IF=1.653.**
21. Javaria Amin, Muhammad Sharif, Mudassar Raza, Tanzila Saba, **Rafiq Sial**, Shafqat Ali Shad, Brain tumor detection: a long short-term memory (LSTM)-based learning model, Neural Computing and Applications, **IF=2.697,** <https://link.springer.com/article/10.1007/s00521-019-04650-7>
22. Muhammad Aslam Noor, Muhammad **Rafiq,** Salah-Ud-Din Khan, Muhammad Amer Qureshi, Muhammad Kamran, Shahab-Ud-Din Khan, Faisal Saeed, and Hijaz Ahmad, Analytical Solutions to Contact Problem with Fractional Derivatives in the Sense of Caputo, IF= 1.541, THERMAL SCIENCE: Year 2020, Vol. 24, Suppl. 1, pp. S313-S323
23. **Muhammad Rafiq**, Muhammad Aslam Noor, Shabieh Farwa, Muhammad Kamran,Faisal Saeed,Hijaz Ahmad, Series Solution to Fractional Contact Problem Using Caputo's Derivative, Open Physics 2021; 19: 402–412, IF: 1.067.
24. Asmat Ullah Yahya, Imran Siddique, Nadeem Salamat, Hijaz Ahmad, **Muhammad Rafiq,** Sameh Askar and Sohaib Abdal, Numerical study of hybridized Williamson nanofluid flow with TC4 and Nichrome over an extending surface, Open Physics, vol. 21, no. 1, pp. 20220246, **2023. IF:** 1.9.
25. Muhammad Amer Qureshi, **Muhammad Rafiq,** Yasir Bashir, Aijaz Ahmad, Analytical and Numerical Approach for the Analysis of Heat Transfer of Squeezing Flow between Two Parallel Plates, Case Studies in Thermal Engineering, **vol. 54, pages: 103979, 2024. IF:6.8.**
26. [**Muhammad Rafiq**](https://www.nature.com/articles/s41598-024-51706-3#auth-Muhammad-Rafiq-Aff1)**,**  [Muhammad Kamran](https://www.nature.com/articles/s41598-024-51706-3#auth-Muhammad-Kamran-Aff1),  [Hijaz Ahmad](https://www.nature.com/articles/s41598-024-51706-3#auth-Hijaz-Ahmad-Aff2-Aff3-Aff4-Aff5) and [Afis Saliu](https://www.nature.com/articles/s41598-024-51706-3#auth-Afis-Saliu-Aff6), Critical Analysis for Nonlinear Oscillations by Least Square HPM, Scientific Reports, vol: 14(1), pages: 1456, **2024. IF:4.6.**
27. **Muhammad Rafiq,** Afis Saliu, A novel analytical method for the assessment of heat transfer in a squeezing flow between two parallel plates, Scientific Reports, **2023. Submitted.**
28. Ji-Huan He**, Muhammad Rafiq,** Muhammad Amer Qureshi, The Least Square HPM Method for solving Physical Problems on Finite and Semi-Infinite domains, Heliyon**, 2023. Submitted.**

**RESEARCH PROJECTS**

Completed research project as a Principal Investigator of the Project No. 3-72/IPFP-SRG/CIIT/Wah/13/1181 under the Start-Up Research Grant Program (SRGP) funded by Higher Education Commission (HEC).

**Thesis Supervision**

Supervised Four MS Student, currently supervising two MS and One PhD student.

**Additional Services:** (International, Institutional or Social Services)

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| Spring2023 to date | Head of Department |
| Fall 2021 to Fall 2022 | Graduate Coordinator |
| Spring 2023 to date | Convener of DARC |
| Spring 2023 to date | Convener of Graduate Admission Committee |
| Spring 2023 to date | Convener of Event Organizing Committee |
| Spring 2023 to date | Member organizing committee for Open House/Job Fair |
| Spring 2020 to Fall2022 | Member of Graduate Admission Committee |
| Spring 2013 to date | Member of COMSATS Mathematical Olympiad |
| Spring  2013 | Member of Result/Examination Scrutiny Committee |
| Fall  2013 | Member of Result/Examination Scrutiny Committee |
| Spring  2014 | Member of Result/Examination Scrutiny Committee |
| Spring 2020 to date | Member of ORIC, |
| Spring 2020 to Spring 2021 | Member of DARC |
| Spring 2020 to date | Member of SAR |

**WORK EXPERIENCE**

**Teaching Assistant Ship in GIK Institute Topi (Pakistan)**

Teaching Assistant of Calculus I in Fall 2002.

TeachingAssistant of Engineering Statistics in Spring 2003.

Teaching Assistant of Differential Equations in Fall 2003.

Teaching Assistant of Calculus II in Spring 2004.

**Teaching in Mathematics COMSATS Institute of Information Technology Campus, Wah Cantt (Pakistan) since July 2004 to date**

Numerical Analysis, Advanced Numerical Analysis, Numerical Solutions of Differential Equations, Variational Inequalities, Calculus, Ordinary Differential Equations, Linear Algebra, Business Mathematics, Business Mathematics and Statistics

**SKILLS**

MATLAB & MAPLE programming for solving Numerical Analysis Problems, Matlab programming for solving Numerical Solutions of Ordinary and Partial differential equations, Proficiency in M.S word, Excel and power point.

**ACHIEVEMENTS**

Won scholarship for M.S from GIK Institute Topi

**EXTRA CURRICULAR**

Badminton, Football and Swimming.

**REFERENCES**

1. Prof. Dr. Muhammad Aslam Noor, Department of Mathematics, COMSATS University Islamabad, Pakistan. [noormaslam@hotmail.com](mailto:noormaslam@hotmail.com)
2. Prof. Dr. Muhammad Abid, Director, CUI Wah Campus, Pakistan. [drabid@ciitwah.edu.pk](mailto:drabid@ciitwah.edu.pk)