Dr. Muhammad Irfan

PhD Mathematics (HEC Approved Supervisor)

Top 2% scientists declared by **Stanford University, USA** in **2020** and **2023**
Editor of **Frontiers in Energy Research** (I.F.: 3.4)
Guest Editor of **Mathematical Problems in Engineering** (I.F.: 1.43)
Total Impact of research articles: 428.423
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Profile

PhD in Mathematics (Applied) from Quaid-I-Azam University Islamabad, Pakistan. My area of interest is Theoretical and Computational fluid mechanics. My research in fluid mechanics focuses on Nanotechnology, Nanoscience and Biomechanics where particular attention is given to understanding the heat transfer properties concerning Nanofluids. All of my research articles have been published in international recognized impact factor journals.

Education

PhD Mathematics
Quaid-I-Azam University, Islamabad, Pakistan **(Nov-2019)**

M. Phil Mathematics
Quaid-I-Azam University, Islamabad, Pakistan **(Sep-2014)**

M. Sc. Mathematics
Quaid-I-Azam University, Islamabad, Pakistan **(Feb-2012)**

B.Sc. (Math A, B & Statistics)
FG. Sir Syed College, Rawalpindi, Pakistan **(July-2009)**

F.Sc. (Math, Statistics & Comp. Sci.)
Pakistan Advance College of Excellence, Rawalpindi, Pakistan **(July-2007)**

Matriculation (Science)
Anwar-Ul-Islam Model School Rawalpindi, Pakistan **(July-2005)**

Bachelor of Education (B.Ed.)
Allama Iqbal Open University Islamabad, Pakistan **(Dec-2013)**

Experience

Assistant Professor • Federal Urdu University of Arts, Science & Technology, Islamabad, Pakistan
14 March 2022- To date

Assistant Professor • Faculty of Basic Sciences, Department of Mathematics, University of WAH, WAH Cantt
28 Sep 2021 – 25 Feb 2022

Visiting Assistant Professor • Federal Urdu University of Arts, Science & Technology, Islamabad, Pakistan
March 2018 – Aug 2021

Visiting Assistant Professor • Riphah International University, Islamabad, Pakistan
Feb 2019 – Aug 2021

Visiting Assistant Professor • COMSATS University, Islamabad, Pakistan
22 Feb 2021 - Aug 2021

Visiting Assistant Professor • Quaid-I-Azam University, Islamabad, Pakistan
Oct 2019 - Sep 2020, Spring 22 Feb 2021 - Aug 2021 and 28 Feb 2022- Feb 2023

Lecturer • Govt. Gordon College, Rawalpindi, Pakistan
Oct 2013 - Sep 2016

Scholarship/Award

Editor of Frontiers in Energy Research (I.F.: 3.4)

Guest Editor of Mathematical Problems in Engineering (I.F.: 1.305)
Advances in Mathematical Modeling of Flow Problems with Fractional Derivatives

Honors
Top 2% Scientists affirmed by **Stanford University, USA** in **2020** and **2023**

PhD Scholarship

Merit Scholarship for 3 years from Quaid-I-Azam University, Islamabad, Pakistan

Postgraduate Scholarship

Merit Scholarship for 2 years from Quaid I Azam University, Islamabad, Pakistan

Graduate Scholarship

Certificate of Merit from F.G. Sir Syed College, the Mall, Rawalpindi, Pakistan **(1st Position in BSc)**

Intermediate Scholarship

Award of Merit Scholarship for 2 year **(2007-2008)** in HSSC From

Federal Board of Intermediate and Secondary Education (FBISE), Pakistan

Thesis

- **PhD Mathematics:** On Stretched Flows of Carreau Fluid with Heat Transfer: Modeling and Analysis
  Supervised by : Prof. Dr. Masood Khan

- **MPhil Mathematics:** Radiation Effects on Flow of a Nanofluid with Variable Thermal Conductivity
  Supervised by : Prof. Dr. Masood Khan

Thesis Supervised

Co-Supervision

In progress

- **Mr. Nadeem Nasir (PhD)**
  Title of thesis: Rheology of nonlinear hydro-magnetic fluids with stretching boundaries
- **Miss Ifza Javed (M. Phil.)**
  Title of thesis: Numerical Analysis of Magnetized Nanofluid Flow with Ferromagnetic Nanoparticles
- **Miss Komal Bashir (M. Phil.)**
  Title of thesis: Heat Transfer Analysis of Ferromagnetic Nanofluid with Radiation Aspects

Research Project

Higher Education Commission Research Project
No. 6210/Federal/NRPU/R&D/HEC/2016
On Multiple Solutions for Unsteady Boundary Layer Flows of Generalized Newtonian Fluids

Research Interest

- Fluid Mechanics
- Mathematical modelling using different fluid models and varying geometries.
- Exact and approximate solutions of linear and nonlinear boundary value problems arising in non-Newtonian fluid mechanics by using exact and analytical methods like perturbation method, Adomian decomposition method (ADM), Homotopy perturbation method (HPM), Homotopy analysis method (HAM), Numerical technique bvp4c, shooting method
- Computational fluid dynamics (CFD): Solution of nonlinear boundary value problems in fluid mechanics through advanced numerical techniques.
- Comparison of results obtained by analytical methods and numerical techniques, where possible.
- Boundary Layer Problems for Newtonian and Non-Newtonian Fluids

Courses Taught

Calculus -I & II
Ordinary / Partial Differential Equations
Linear Algebra
Modeling and Simulation
Fluid Mechanics
Mathematical statistics
Discrete Structure and Logics
Special Functions
Integral Equations
Mechanics
Mathematics IV & V
Differential Geometry II
Differential Equations and Linear Algebra
Advanced Integral Equations
Computing for Mathematical Tools
Mathematical Physics-I & II

Conferences

- 5th International Conference on "Recent Developments in Fluid Mechanics" June 24-26, 2013, Quaid-I-Azam University, Islamabad, Pakistan.
- 7th International Conference on "Recent Developments in Fluid Mechanics and Environmental sciences" February 13-15, 2018, Quaid-I-Azam University, Islamabad, Pakistan.
- 6th Multi-Disciplinary Student Research International Conference (MDSRIC-2021) December 08-09, 2021 University of Wah.

List of Publications

1. W.A. Khan, **M. Irfan**, M. Khan, A.S. Alshomrani, A.K. Alzahrani and M.S. Alghamdi, Impact of chemical processes on magneto nanoparticle for the generalized Burgers fluid, Journal of Molecular Liquids, **234 (2017) 201-208; https://doi.org/10.1016/j.molliq.2017.03.078.**

2. M. Khan, **M. Irfan** and W.A. Khan, Impact of nonlinear thermal radiation and gyrotactic microorganisms on the Magneto-Burgers nanofluid, International Journal of Mechanical Sciences, **130 (2017) 375-382**; **https://doi.org/10.1016/j.ijmecsci.2017.06.030.**

3. M. Khan, **M. Irfan**, W.A. Khan and L. Ahmad, Modeling and simulation for 3D magneto Eyring-Powell nanomaterial subject to nonlinear thermal radiation and convective heating, Results in Physics, **7 (2017) 1899-1906; https://doi.org/10.1016/j.rinp.2017.06.002**.

4. M. Khan, **M. Irfan**, W.A. Khan and A.S. Alshomrani, A new modeling for 3D Carreau fluid flow considering nonlinear thermal radiation, Results in Physics, **7 (2017) 2692-2704; https://doi.org/10.1016/j.rinp.2017.07.024**.

5. M. Khan, **M. Irfan** and W.A. Khan, Numerical assessment of solar energy aspects on 3D magneto-Carreau nanofluid: A revised proposed relation, International Journal of Hydrogen Energy, **42 (2017) 22054-22065; https://doi.org/10.1016/j.ijhydene.2017.07.116**.

6. **M. Irfan**, M. Khan and W.A. Khan, Numerical analysis of unsteady 3D flow of Carreau nanofluid with variable thermal conductivity and heat source/sink, Results in Physics, **7 (2017) 3315-3324; https://doi.org/10.1016/j.rinp.2017.08.029**.

7. W.A. Khan, **M. Irfan** and M. Khan, An improved heat conduction and mass diffusion models for rotating flow of an Oldroyd-B fluid, Results in Physics, **7 (2017) 3583-3589; https://doi.org/10.1016/j.rinp.2017.08.068**.

8. W.A. Khan, M. Khan, **M. Irfan** and A.S. Alshomrani, Impact of melting heat transfer and nonlinear radiative heat flux mechanisms for the generalized Burgers fluids, Results in Physics, **7 (2017) 4025-4032; https://doi.org/10.1016/j.rinp.2017.10.004**.

9. M. Khan, **M. Irfan** and W.A. Khan, Impact of forced convective radiative heat and mass transfer mechanisms on 3D Carreau nanofluid: A numerical study, The European Physical Journal Plus, **(2017) doi.org/10.1140/epjp/i2017-11803-3.**

10. M. Khan, **M. Irfan** and W.A. Khan, Thermophysical properties of unsteady 3D flow of magneto Carreau fluid in presence of chemical species: A numerical approach, Journal of the Brazilian Society of Mechanical Sciences and Engineering, (2018) **doi.org/10.1007/s40430-018-0964-4**.

11. M. Khan, **M. Irfan**, W.A. Khan and M. Ayaz, Aspects of improved heat conduction relation and chemical processes on 3D Carreau fluid flow, Pramana Journal of Physics, (2018) **doi.org/10.1007/s12043-018-1579-0**.

12. M. Khan, **M. Irfan** and W.A. Khan, Impact of heat source/sink on radiative heat transfer to Maxwell nanofluid subject to revised mass flux condition, Results in Physics, 9 (2018) 851-857; https://doi.org/10.1016/j.rinp.2018.03.034.

13. **M. Irfan**, M. Khan and W.A. Khan, Interaction between chemical species and generalized Fourier's law on 3D flow of Carreau fluid with variable thermal conductivity and heat sink/source: A numerical approach, Results in Physics, **10** (2018) 107-117; https://doi.org/10.1016/j.rinp.2018.04.036.

14. **M. Irfan**, M. Khan, W.A. Khan and M. Ayaz, Modern development on the features of magnetic field and heat sink/source in Maxwell nanofluid subject to convective heat transport, Physics Letters A, **382** (2018) 1992-2002; https://doi.org/10.1016/j.physleta.2018.05.008.

15. M. Khan, **M. Irfan**, L. Ahmad and W.A. Khan, Simultaneous investigation of MHD and convective phenomena on time-dependent flow of Carreau nanofluid with variable properties: Dual solutions, Physics Letters A, **382** (2018) 2334-2342; https://doi.org/10.1016/j.physleta.2018.05.033.

16. W.A. Khan, M. Ali, F. Sultan, M. Shahzad, M. Khan and **M. Irfan**, Numerical interpretation of autocatalysis chemical reaction for nonlinear radiative 3D flow of Cross magneto-fluid, Pramana Journal of Physics, (2019) doi.org/10.1007/s12043-018-1634-x.

17. F. Sultan, W.A. Khan, M. Ali, M. Shahzad, **M. Irfan** and M. Khan, Theoretical aspects of thermophoresis and Brownian motion for 3D flow of Cross fluid with activation energy, Pramana Journal of Physics, (2019) **doi.org/10.1007/s12043-018-1676-0** .

18. M. Khan, **M. Irfan** and W.A. Khan, Heat transfer enhancement for Maxwell nanofluid flow subject to convective heat transport, Pramana Journal of Physics, (2019) doi.org/10.1007/s12043-018-1690-2.

19. A.S. Alshomrani, **M. Irfan**, A. Saleem and M. Khan, Chemically reactive flow and heat transfer of magnetite Oldroyd-B nanofluid subject to stratifications, Applied Nanoscience, **8 (2018) 1743–1754; https://doi.org/10.1007/s13204-018-0846-1**.

20. **M. Irfan**, M. Khan, W.A. Khan and M. Sajid, Thermal and solutal stratifications in flow of Oldroyd-B nanofluid with variable conductivity, Applied Physics A, **(2018) doi.org/10.1007/s00339-018-2086-3.**

21. W.A. Khan, A.S. Alshomrani, A.K. Alzahrani, M Khan and **M Irfan**, Impact of autocatalysis chemical reaction on nonlinear radiative heat transfer of unsteady three-dimensional Eyring–Powell magneto-nanofluid flow, Pramana Journal of Physics, (2018) doi.org/10.1007/s12043-018-1634-x.

22. W.A. Khan, I. Haq, M. Ali, M. Shahzad, M. Khan and **M. Irfan**, Significance of static-moving wedge for unsteady Falkner-Skan forced convective flow of MHD Cross fluid, Journal of the Brazilian Society of Mechanical Sciences and Engineering, **(2018) doi.org/10.1007/s40430-018-1390-3.**

23. **M. Irfan**, M. Khan and W.A. Khan, Behavior of stratifications and convective phenomena in mixed convection flow of 3D Carreau nanofluid with radiative heat flux, A numerical approach, Journal of the Brazilian Society of Mechanical Sciences and Engineering, **(2018) doi.org/10.1007/s40430-018-1429-5.**

24. **M. Irfan**, M. Khan and W.A. Khan, On model for three-dimensional Carreau fluid flow with Cattaneo--Christov double diffusion and variable conductivity: A numerical approach, Journal of the Brazilian Society of Mechanical Sciences and Engineering, **(2018) doi.org/10.1007/s40430-018-1498-5.**

25. **M. Irfan**, W.A. Khan, M. Khan and M. Mudassar Gulzar, Influence of Arrhenius activation energy in chemically reactive radiative flow of 3D Carreau nanofluid with nonlinear mixed convection, Journal of Physics and Chemistry of Solids, **125 (2018) 141-152; https://doi.org/10.1016/j.jpcs.2018.10.016**.

26. **M. Irfan**, M. Khan and W.A. Khan, Impact of Non-uniform heat sink/source and convective condition in radiative heat transfer to Oldroyd-B nanofluid: A revised proposed relation, Physics Letters A, **383 (2018) 376-382; https://doi.org/10.1016/j.physleta.2018.10.040**.

27. W.A. Khan, F. Sultan, M. Shahzad, M. Khan, **M. Irfan** and M. Ali, Consequences of activation energy and binary chemical reaction for 3D flow of Cross nanofluid with radiative heat transfer, Journal of the Brazilian Society of Mechanical Sciences and Engineering, (2018) doi.org/10.1007/s40430-018-1482-0.

28. **M. Irfan**, M. Khan and W.A. Khan, Impact of homogeneous-heterogeneous reactions and non-Fourier heat flux theory in Oldroyd-B fluid with variable conductivity, Journal of the Brazilian Society of Mechanical Sciences and Engineering (2019) **doi.org/10.1007/s40430-019-1619-9**.

29. **M. Irfan**, M. Khan, W.A. Khan and M. Sajid, Consequence of convective conditions for flow of Oldroyd-B nanofluid by a stretching cylinder, Journal of the Brazilian Society of Mechanical Sciences and Engineering, (2019) **doi.org/10.1007/s40430-019-1604-3**.

30. **M. Irfan**, M. Khan, W.A. Khan and L. Ahmad, Influence of binary chemical reaction with Arrhenius activation energy in MHD nonlinear radiative flow of unsteady Carreau nanofluid: Dual solutions, Applied Physics A, **(2019) doi.org/10.1007/s00339-019-2457-4.**

31. M. Irfan and M. Khan, Simultaneous impact of nonlinear radiative heat flux and Arrhenius activation energy in flow of chemically reacting Carreau nanofluid, Applied Nanoscience, **10 (2020) 2977–2988; https://doi.org/10.1007/s13204-019-01012-6.**

32. M. Irfan, M. Khan, M. Mudassar Gulzar and W.A. Khan, Chemically reactive and nonlinear radiative heat flux in mixed convection flow of Oldroyd-B nanofluid, Applied Nanoscience, **10 (2019) 3133–3141; https://doi.org/10.1007/s13204-019-01052-y.**

33. I. Haq, M. Shahzad, W.A. Khan, M. Irfan, S. Mustafa, M. Ali, F. Sultan, Characteristics of chemical processes and heat source/sink with wedge geometry, Case Studies in Thermal Engineering, **14 (2019) 100432; https://doi.org/10.1016/j.csite.2019.100432**.

34. M. Shahzad, F. Sultan, M. Ali, W. A. Khan and M. Irfan, Slow Invariant Manifold Assessments in Multi-Route Reaction Mechanism, Journal of Molecular Liquids, **284 (2019) 265-275; https://doi.org/10.1016/j.molliq.2019.03.179**.

35. W.A. Khan, M. Waqas, M. Ali, F. Sultan, M. Shahzad and M. Irfan, Mathematical analysis of thermally radiative time-dependent Sisko nanofluid flow for curved surface, International Journal of Numerical Methods for Heat and Fluid Flow, **29 (2019) 3498-3514; https://doi.org/10.1108/HFF-12-2018-0746.**

36. W.A. Khan, M. Ali, M. Waqas, M. Shahzad, F. Sultan and M. Irfan, Importance of convective heat transfer in flow of non-Newtonian nanofluid featuring Brownian and thermophoretic diffusions, International Journal of Numerical Methods for Heat and Fluid Flow, **29 (2019) 4624-4641; https://doi.org/10.1108/HFF-01-2019-0066**.

37. M. Ali, W.A. Khan, M. Irfan, F. Sultan, M. Shahzed and M. Khan, Computational analysis of entropy generation for Cross nanofluid flow, Applied Nanoscience, **10 (2020) 3045–3055; https://doi.org/10.1007/s13204-019-01038-w.**

38. S.Z. Abbas, W.A. Khan, H. Sun, M. Ali, M. Irfan, M. Shahzed and F. Sultan, Mathematical modeling and analysis of Cross nanofluid flow subjected to entropy generation, Applied Nanoscience, **10 (2020) 3149–3160; https://doi.org/10.1007/s13204-019-01039-9.**

39. W.A. Khan, M. Ali, M. Irfan, M. Khan, M. Shahzad and F. Sultan, A rheological analysis of nanofluid subjected to melting heat transport characteristics, Applied Nanoscience, **10 (2020) 3161–3170; https://doi.org/10.1007/s13204-019-01067-5.**

40. M. Shahzad, H. Sun, F. Sultan, W.A. Khan, M. Ali and M. Irfan, Transport of radiative heat transfer in dissipative Cross nanofluid flow with entropy generation and activation energy, Physica Scripta, **(2019) http://doi.org/10.1088/1402-4896/ab2caf**.

41. S. Muhammad, G. Ali, S.I.A. Shah, M. Irfan, W.A. Khan, M. Ali and S. Sultan, Numerical treatment of activation energy for the three-dimensional flow of a cross magnetonanoliquid with variable conductivity, Pramana Journal of Physics, (2019) **doi.org/ 10.1007/s12043-019-1800-9**.

42. M. Irfan, M. Khan, W.A. Khan and M.S. Alghamdi, Magnetohydrodynamic stagnation point flow of a Maxwell nanofluid with variable conductivity, Communications in Theoretical Physics, **71 (2019) 1493-1500; https://doi.org/10.1088/0253-6102/71/12/1493.**

43. F. Sultan, W.A. Khan, M. Shahzed, H. Sun and M. Irfan, Importance of entropy generation and infinite shear rate viscosity for non-Newtonian nanofluid, Journal of the Brazilian Society of Mechanical Sciences and Engineering, **(2019) http://doi.org/10.1007/s40430-019-1950-1.**

44. S.Z. Abbas, W.A. Khan, H. Sun, M. Irfan, M.I. Khan and M. Waqas, Von Kármán swirling analysis for modeling Oldroyd-B nanofluid considering quartic autocatalysis, Physica Scripta, (2019) **http://doi.org/10.1088/1402-4896/ab450f.**

45. W.A. Khan, H. Sun, M. Shahzed, M. Ali and M. Irfan, Importance of heat generation in chemically reactive flow subjected to convectively heated surface, Indian Journal of Physics, (2020) **http://doi.org/10.1007/s12648-019-01678-2.**

46. M. Ali, S.Z. Abbas, H. Sun, W.A. Khan, M. Waqas, **M. Irfan** and S. Ahmad, Modeling and analysis of von Kármán swirling flow for Oldroyd-B nanofluid featuring chemical processes, Journal of the Brazilian Society of Mechanical Sciences and Engineering, (2019); **http://doi.org/10.1007/s40430-019-2050-y.**

47. M. Ali, M. Shahzed, F. Sultan, W.A. Khan, H. Arif and **M. Irfan,** Numerical analysis subject to radiative and chemically reactive species on Cross nanofluid over a stretching cylinder, International Journal of Numerical Methods for Heat and Fluid Flow, **(2019) Accepted.**

48. M. Ali, F. Sultan, W.A. Khan, M. Shahzed, H. Arif and **M. Irfan,** Characteristics of generalized Fourier's heat flux and homogeneous-heterogeneous reactions in 3D flow of non-Newtonian Cross fluid, International Journal of Numerical Methods for Heat and Fluid Flow, **(2019) Accepted.**

49. W. A. Khan, M. Ali, M. Shahzad, F. Sultan, **M. Irfan** and Z. Asghar, A note on activation energy and magnetic dipole aspects for Cross nanofluid subjected to cylindrical surface, Applied Nanoscience, **10 (2020) 3235–3244; https://doi.org/10.1007/s13204-019-01220-0.**

50. J. Wang, W.A. Khan, Z. Asghar, M. Waqas, M.Ali and **M.Irfan**, Entropy optimized stretching flow based on non-Newtonian radiative nanoliquid under binary chemical reaction, Computer Methods and Programs in Biomedicine, 188 (2020) 105274; https://doi.org/10.1016/j.cmpb.2019.105274.

51. W. A. Khan, M. Ali, M. Shahzad, F. Sultan, M. Waqas and **M. Irfan,** A revised perspective of Fourier-Fick laws for Cross material flow with variable mass diffusivity, International Journal of Numerical Methods for Heat and Fluid Flow, (2019) **Accepted.**

52. S.Z. Abbas, W.A. Khan, M. Waqas, **M. Irfan** and Z. Asghar, Exploring the features for flow of Oldroyd-B liquid film subjected to rotating disk with homogeneous/heterogeneous processes, Computer Methods and Programs in Biomedicine, 189 (2020) 105323; https://doi.org/10.1016/j.cmpb.2020.105323**.**

53. W. A. Khan, M. Waqas, S. Kadry, Z. Asghar, S. Z. Abbas and **M. Irfan**, On the evaluation of stratification based entropy optimized hydromagnetic flow featuring dissipation aspect and Robin conditions, Computer Methods and Programs in Biomedicine, 190 (2020) 105347; https://doi.org/10.1016/j.cmpb.2020.105347.

54. M. Khan, A. Ahmed, **M. Irfan** and J. Ahmed, Analysis of Cattaneo–Christov theory for unsteady flow of Maxwell fluid over stretching cylinder, Journal of Thermal Analysis and Calorimetry, **(2020) doi.org/10.1007/s10973-020-09343-1.**

55. M.I. Khan, **M. Irfan**, W. A. Khan, M. Waqas, Sadia Rashid, Activation energy analysis in entropy optimized reactive flow, Applied Nanoscience **10 (2020) 2673–2683; https://doi.org/10.1007/s13204-020-01305-1**.

56. **M. Irfan**, M. Khan, W.A. Khan and K. Rafiq, Physical aspects of shear thinning/thickening behavior in radiative flow of magnetite Carreau nanofluid with nanoparticle mass flux conditions, Applied Nanoscience, **10 (2020) 3021–3033; https://doi.org/10.1007/s13204-020-01323-z.**

57. **M. Irfan**, K. Rafiq, W.A. Khan and M. Khan, Numerical Analysis of Unsteady Carreau Nanofluid Flow with Variable Conductivity, Applied Nanoscience, **10 (2020) 3075–3084; https://doi.org/10.1007/s13204-020-01331-z.**

58. A. Ahmed, M. Khan, **M. Irfan** and J. Ahmed, Transient MHD flow of Maxwell nanofluid subject to non-linear thermal radiation and convective heat transport, Applied Nanoscience **(2020) doi.org/10.1007/s13204-020-01375.**

59. M. Ali, **M. Irfan**, W.A. Khan, F. Sultan, M. Shahzad and M. Khan, Physical significance of chemical processes and Lorentz's forces aspects on Sisko fluid flow in curved configuration, Soft Computing, **24 (2020) 16213–16223; https://doi.org/10.1007/s00500-020-04935-3.**

60. **M. Irfan**, W.A. Khan, M. Khan and M. Waqas, Evaluation on Arrhenius activation energy and nanoparticles condition in magnetite Carreau nanofluid considering chemical reaction and radiation: Dual solutions, Applied Nanoscience, **10 (2020) 5279-5289; https://doi.org/10.1007/s13204-020-01449-0.**

61. **M. Irfan**, M. Khan, W.A. Khan, M. Alghamdi and M. Zaka Ullah, Influence of thermal-solutal stratifications and thermal aspects of non-linear radiation in stagnation point Oldroyd-B nanofluid flow, International Communications in Heat and Mass Transfer, **116 (2020) 104636; https://doi.org/10.1016/j.icheatmasstransfer.2020.104636.**

62. **M. Irfan**, M.S. Anwar, M. Rashid, M. Waqas and W.A. Khan, Arrhenius activation energy aspects in mixed convection Carreau nanofluid with nonlinear thermal radiation, Applied Nanoscience, **10 (2020) 4403-4413; https://doi.org/10.1007/s13204-020-01498-5.**

63. M.S. Anwar, R.T.M. Ahmad, T. Shahzad, **M. Irfan** and M.Z. Ashraf, Electricfield fractional nanofluid flow with suspended carbon nanotubes, Computer and Mathematics with Applications, **80 (2020) 1375-1386; https://doi.org/10.1016/j.camwa.2020.07.005**.

64. Z. Asghar, M. Kousar, M. Waqas, **M. Irfan**, M. Bilal and W.A. Khan, Heat generation in mixed convected Williamson liquid stretching liquid flow under generalized Fourier concept, Applied Nanoscience, **10 (2020) 4439–4444; https://doi.org/10.1007/s13204-020-01500-0.**

65. B. Jamil, M.S. Anwar, A. Rasheed and **M. Irfan**, MHD Maxwell flow modeled by fractional derivatives with chemical reaction and thermal radiation, Chinese Journal of Physics, **67 (2020) 512-533; https://doi.org/10.1016/j.cjph.2020.08.012.**

66. **M. Irfan**, M. Khan and W.A. Khan, Heat sink/source and chemical reaction in stagnation point Maxwell nanofluid flow, Applied Physics A, **(2020); https://doi.org/10.1007/s00339-020-04051-x.**

67. **M. Irfan**, K. Rafiq, M. Khan, M. Waqas and M.S. Anwar, Theoretical analysis of new mass flux theory and Arrhenius activation energy in Carreau nanofluid with magnetic influence, International Communications in Heat and Mass Transfer, **120 (2020); https://doi.org/10.1016/j.icheatmasstransfer.2020.105051Get%20r.**

68. M. Waqas, A. Ahmed, Z. Asghar, **M. Irfan**, W.A. Khan and Z. Ahmed, Visualization of non-linear convective Williamson liquid based on generalized heat-mass theories, Physica Scripta, **(2020); https://doi.org/10.1088/1402-4896/abc5ec.**

69. M.S. Anwar, I. Ali, A. Rasheed, **M. Irfan** and Z. Hussain, Fractional calculus approach for the phase dynamics of Josephson junction, Chaos, Solitons & Fractals, **143 (2021) 110572; https://doi.org/10.1016/j.chaos.2020.110572.**

70. K. Rafiq, **M. Irfan**, M. Khan, M.S. Anwar and W.A. Khan, Arrhenius activation energy theory in radiative flow of Maxwell nanofluid, Physica Scripta, **96 (2021); https://doi.org/10.1088/1402-4896/abd903**.

71. **M. Irfan,** Study of Brownian motion and thermophoretic diffusion on non-linear mixed convection flow of Carreau nanofluid subject to variables properties, Surfaces and Interfaces, **(2021) http://doi.org/10.1016/j.surfin.2021.100926.**

72. Z. Shah, M.A.S. Raja, Yu-Ming, W.A. Khan, S.Z. Abbas, M. Shoaib and **M. Irfan**, Computational intelligence of Levenberg-Marquardt Backpropagation neural networks to study the dynamics of expanding/contracting cylinder for Cross magneto-nanofluid flow model, Physica Scripta, **(2021) http://doi.org/10.1088/1402-4896/abe068**.

73. Pei-Ying Xiong, A. Hamid, K. Iqbal, **M. Irfan**, M. Khan, Numerical simulation of mixed convection flow and heat transfer in the lid-driven triangular cavity with different obstacle configurations, International Communications in Heat and Mass Transfer, **123 (2021) http://doi.org/10.1016/j.icheatmasstransfer.2021.105202Get.**

74. M. Waqas, U.A. Nasir, S.A. Shehzad, **M. Irfan** and W.A. Khan, A non-linear mathematical analysis of thermally radiative stratified nanoliquid featuring the aspects of magnetic field, Robin conditions and thermal radiation, International Communications in Heat and Mass Transfer, **125 (2021); https://doi.org/10.1016/j.icheatmasstransfer.2021.105199**.

75. **M. Irfan**, R. Aftab and M. Khan, Thermal performance of Joule heating and nonlinear radiation in Oldroyd-B nanofluid considering thermal-solutal convective conditions, Chinese Journal of Physics, **71 (2021) 444-457; https://doi.org/10.1016/j.cjph.2021.03.010.**

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